

PERFORMANCE EVALUATION REPORT
WATER POLLUTION STUDY NUMBER WPO31

DATE: 12/27/93

LABORATORY: PA009

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	230.	228	156- 277	171- 262	ACCEPTABLE
	2	392.	387	268- 486	296- 459	ACCEPTABLE
VANADIUM	1	985.	940	832- 1040	860- 1020	ACCEPTABLE
	2	177.	170	146- 188	151- 183	ACCEPTABLE
ZINC	1	899.	842	737- 947	763- 921	ACCEPTABLE
	2	50.0	46.3	37.5- 56.1	39.8- 53.7	ACCEPTABLE
ANTIMONY	3	54.0	94.5	56.4- 119	64.3- 111	NOT ACCEPTABLE
	4	149.	189	108- 244	125- 227	ACCEPTABLE
SILVER	3	74.9	73.9	60.6- 86.0	67.9- 81.5	ACCEPTABLE
	4	26.2	25.8	21.1- 30.4	22.2- 29.2	ACCEPTABLE
THALLIUM	3	58.4	62.0	47.0- 77.1	50.9- 73.4	ACCEPTABLE
	4	490.	539	421- 643	450- 615	ACCEPTABLE
MOLYBDENUM	3	20.2	24.5	18.6- 30.6	20.2- 29.0	ACCEPTABLE
	4	77.2	81.6	64.4- 95.0	68.3- 91.1	ACCEPTABLE
STRONTIUM	3	18.4	19.1	14.4- 23.3	15.5- 22.1	ACCEPTABLE
	4	74.2	73.4	62.0- 84.5	64.9- 81.5	ACCEPTABLE
TITANIUM	3	116.	130	109- 151	114- 145	ACCEPTABLE
	4	36.7	43.0	34.0- 53.4	36.5- 53.9	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	9.32	9.50	9.19- 9.75	9.26- 9.64	ACCEPTABLE
	4	4.68	4.70	4.62- 4.77	4.64- 4.75	ACCEPTABLE
SPEC. COND. (UMHOS/CM AT 25 C)	1	913.	899	840- 940	857- 963	ACCEPTABLE
	2	408.	398	368- 435	377- 427	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

AR303136

132051

DATE: 12/27/93

PERFORMANCE EVALUATION REPORT

WATER POLLUTION STUDY NUMBER WP031

LABORATORY: PA009

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
TDS AT 180 C	1	506.	577	396-	759	401- 713
	2	210.	223	168-	244	193- 260
TOTAL HARDNESS (AS CaCO3)	1	270.	279	236-	307	245- 390
	2	75.5	57.4	51.2-	63.8	52.8- 62.2 NOT ACCEPTABLE
CALCIUM	1	105.	110	87.4-	126	92.2- 171
	2	7.00	7.00	5.95-	8.19	6.23- 7.91
MAGNESIUM	1	1.03	0.960	0.771-	1.18	0.822- 1.13
	2	9.60	9.70	8.30-	11.0	8.71- 10.6
SODIUM	1	57.5	61.7	56.2-	67.8	57.6- 66.3 CHECK FOR ERROR
	2	24.8	26.3	23.6-	29.2	20.3- 28.5
POTASSIUM	1	7.00	7.50	6.39-	8.91	6.70- 8.50
	2	39.8	40.0	30.5-	45.6	35.9- 48.2
TOTAL ALKALINITY (AS CaCO3)	1	117.	120	106-	133	109- 130
	2	10.7	11.0	7.85-	15.3	0.77- 14.3
CHLORIDE	1	188.	199	183-	211	187- 210 CHECK FOR ERROR
	2	37.9	41.2	36.5-	45.8	37.6- 48.3
FLUORIDE	1	3.27	3.30	2.83-	3.77	2.95- 3.65
	2	0.355	0.300	0.319-	0.457	0.336- 0.439
SULFATE	1	11.9	14.0	10.0-	16.8	11.5- 16.0
	2	89.9	92.0	78.1-	105	81.5- 102

NUTRIENTS IN MILLIGRAMS PER LITER:

AMMONIA-NITROGEN	1	0.00	7.70	6.10-	9.16	6.07- 9.79
	2	1.02	0.730	0.891-	0.902	0.550- 0.923 NOT ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

AR303137

PERFORMANCE EVALUATION REPORT
DATE: 12/27/93
WATER POLLUTION STUDY NUMBER WFO31

LABORATORY: PAUW9

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
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NUTRIENTS IN MILLIGRAMS PER LITER:

NITRATE-NITROGEN	1	0.50	0.520	0.378-0.658	0.412-0.625	UNUSABLE DATA
	2	11.3	11.0	8.84-13.0	9.34-12.5	ACCEPTABLE
ORTHOPHOSPHATE	1	0.156	0.150	0.114-0.197	0.122-0.178	ACCEPTABLE
	2	4.36	4.10	3.48-4.64	3.62-4.58	ACCEPTABLE
KJELDAHL-NITROGEN	3	15.4	14.0	10.3-17.1	11.1-16.1	ACCEPTABLE
	4	0.663	0.710	0.226-1.32	0.357-1.19	ACCEPTABLE
TOTAL PHOSPHORUS	3	7.18	7.90	5.57-8.05	5.06-7.75	ACCEPTABLE
	4	0.452	0.490	0.301-0.569	0.369-0.542	ACCEPTABLE

DEMANDS IN MILLIGRAMS PER LITER:

COD.	1	68.5	70.8	52.4-84.6	56.5-80.5	ACCEPTABLE
	2	196.	207	163-230	172-221	ACCEPTABLE
TOC	1	26.3	28.0	23.9-32.8	25.0-31.6	ACCEPTABLE
	2	81.6	82.0	69.5-95.3	72.8-91.9	ACCEPTABLE
5-DAY BOD	1	50.7	44.9	26.1-60.1	30.3-55.8	ACCEPTABLE
	2	148.	131	75.4-180	88.5-167	ACCEPTABLE
CARBONACEOUS BOD	1	42.0	38.5	16.5-60.4	22.5-58.8	ACCEPTABLE
	2	124.	112	52.0-171	69.0-155	ACCEPTABLE

PCB'S IN MICROGRAMS PER LITER:

PCB-AROCLO 1254	1	1.71	1.07	0.988-2.71	1.21-2.09	ACCEPTABLE
	2	3.93	4.63	2.79-5.05	3.19-5.56	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

AR303138

DATE: 12/27/93

PERFORMANCE EVALUATION REPORT

WATER POLLUTION STUDY NUMBER WPOJ1

LABORATORY: PA009

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE	ACCEPTANCE LIMITS	VARIING LIMITS	PERFORMANCE EVALUATION
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PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:

PCB IN OIL- 1916/1242 2 37.9 35.3 8.02- 46.6 13.0- 41.6 ACCEPTABLE

PCB IN OIL- 1254 1 32.8 43.9 13.5- 61.8 17.8- 55.5 ACCEPTABLE

PESTICIDES IN MICROGRAMS PER LITER:

CHLORDANE 3 7.77 8.21 0.91- 9.72 5.52- 9.11 ACCEPTABLE
4 1.07 2.21 1.07- 2.77 1.29- 2.56 ACCEPTABLE

ALDRIN 1 0.390 0.539 0.122-0.750 0.202-0.678 ACCEPTABLE
2 0.069 0.086 0.171-0.121 0.103-0.109 ACCEPTABLE

DIELDRIN 1 0.577 0.475 0.203-0.710 0.267-0.645 ACCEPTABLE
2 0.219 0.173 0.061-0.239 0.106-0.219 ACCEPTABLE

DDD 1 0.077 0.866 0.433- 1.15 0.524- 1.06 ACCEPTABLE
2 0.221 0.202 0.0956-0.268 0.117-0.206 ACCEPTABLE

DD2 1 0.507 0.539 0.235-0.756 0.301-0.690 ACCEPTABLE
2 0.170 0.173 0.088-0.236 0.099-0.216 ACCEPTABLE

DDT 1 0.836 0.796 0.362- 1.06 0.450-0.972 ACCEPTABLE
2 0.160 0.142 0.0570-0.216 0.072-0.196 ACCEPTABLE

HEPTACHLOR 1 0.541 0.669 0.197-0.910 0.279-0.825 ACCEPTABLE
2 0.186 0.216 0.0756-0.269 0.100-0.285 ACCEPTABLE

HEPTACHLOR EPOXIDE 1 0.495 0.478 0.260-0.640 0.300-0.592 ACCEPTABLE
2 0.183 0.174 0.0858-0.235 0.105-0.216 ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

AR303139

PERFORMANCE EVALUATION REPORT
DATE: 12/27/93
WATER POLLUTION STUDY NUMBER WP031

LABORATORY: PAUOY

ANALYSIS	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE	ACCEPTANCE LIMITS	VARIATION LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
1,2 DICHLOROETHANE	1	15.2	15.1	10.2-20.8	11.5-19.1	ACCEPTABLE
	2	56.6	55.0	36.2-73.4	40.9-69.7	ACCEPTABLE
CHLOROFORM	1	12.1	11.0	7.85-15.9	8.96-18.9	ACCEPTABLE
	2	71.9	68.4	38.3-86.7	44.4-80.6	ACCEPTABLE
1,1,1 TRICHLOROETHANE	1	14.3	13.4	8.60-18.2	9.89-17.0	ACCEPTABLE
	2	40.3	37.8	22.7-50.0	26.2-46.6	ACCEPTABLE
TRICHLOROETHENE	1	7.86	7.57	5.10-10.1	5.75-9.67	ACCEPTABLE
	2	68.1	62.7	38.6-80.5	43.9-75.2	ACCEPTABLE
CARBONTETRACHLORIDE	1	17.8	16.4	10.9-22.7	12.1-20.4	ACCEPTABLE
	2	40.2	37.1	23.0-50.1	26.4-46.4	ACCEPTABLE
TETRACHLOROETHENE	1	10.0	9.24	6.09-12.5	6.49-11.7	ACCEPTABLE
	2	53.0	51.3	31.2-66.7	35.7-62.2	ACCEPTABLE
BROMODICHLOROMETHANE	1	11.7	10.8	7.33-14.2	8.21-13.3	ACCEPTABLE
	2	41.7	38.1	24.9-53.6	29.5-50.0	ACCEPTABLE
DIBROMOCHLOROMETHANE	1	14.1	13.1	8.40-17.0	9.55-15.9	ACCEPTABLE
	2	61.0	58.1	34.1-80.2	39.9-74.8	ACCEPTABLE
BROMOFORM	1	15.7	14.5	7.45-20.0	9.04-18.4	ACCEPTABLE
	2	44.3	42.3	25.5-59.9	29.9-55.6	ACCEPTABLE
METHYLENE CHLORIDE	1	11.6	10.6	6.54-16.1	7.79-14.0	ACCEPTABLE
	2	56.5	54.1	30.7-76.5	36.5-70.7	ACCEPTABLE
CHLOROBENZENE	1	17.3	16.0	11.4-20.1	12.5-19.0	ACCEPTABLE
	2	70.4	63.7	41.3-79.8	46.2-74.9	ACCEPTABLE
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
BENZENE	1	16.0	10.1	25.7-56.0	29.5-52.2	ACCEPTABLE
	2	7.22	6.25	5.24-11.6	6.04-10.8	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

AR303140

DATE: 12/27/93

PERFORMANCE EVALUATION REPORT

WATER POLLUTION STUDY NUMBER WPO31

LABORATORY: PA009

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
ETHYLBENZENE	1	63.2	66.9	36.0-90.3	43.0-86.9	ACCEPTABLE
	2	12.5	14.0	9.26-19.0	10.5-17.8	ACCEPTABLE
TOLUENE	1	47.0	49.2	30.2-65.2	30.6-60.8	ACCEPTABLE
	2	8.50	9.51	6.09-12.0	6.93-11.9	ACCEPTABLE
1,2-DICHLOROBENZENE	1	58.6	65.5	32.7-93.9	40.5-86.2	ACCEPTABLE
	2	7.87	8.88	5.05-11.7	6.59-11.0	ACCEPTABLE
1,3-DICHLOROBENZENE	1	43.6	47.9	29.4-61.7	33.5-57.6	ACCEPTABLE
	2	14.4	16.6	11.6-21.1	12.9-19.9	ACCEPTABLE
1,4-DICHLOROBENZENE	1	58.2	62.5	34.4-85.8	41.0-79.3	ACCEPTABLE
	2	10.7	12.4	7.49-17.8	8.79-16.5	ACCEPTABLE
MISCELLANEOUS PARAMETERS:						
TOTAL CYANIDE (IN MG/L)	1	0.885	0.860	0.598-1.15	0.668-1.08	ACCEPTABLE
	2	0.147	0.160	0.102-0.208	0.116-0.198	ACCEPTABLE
NON-FILTERABLE RESIDUE (IN MG/L)	1	54.4	61.0	47.7-64.6	49.0-62.5	ACCEPTABLE
	2	70.8	83.0	62.0-91.3	66.4-87.8	ACCEPTABLE
OIL AND GREASE (IN MG/L)	1	8.55	8.30	3.07-12.2	4.22-11.0	ACCEPTABLE
	2	40.5	40.4	33.7-56.0	36.5-53.2	ACCEPTABLE
TOTAL PHENOLICS (IN MG/L)	1	0.413	0.595	0.312-0.878	0.348-0.805	ACCEPTABLE
	2	2.36	3.13	1.66-4.60	2.00-4.23	ACCEPTABLE
TOTAL RESIDUAL CHLORINE (IN MG/L)	1	3.01	3.70	3.06-4.52	3.25-4.32	NOT ACCEPTABLE
	2	1.35	1.50	1.09-1.77	1.18-1.58	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

AR303141

PERFORMANCE EVALUATION REPORT
LABORATORY PA009
WATER SUPPLY STUDY NUMBER 35032
DATE: 3/12/93
LANCASTER LABORATORIES
717652201/LANCASTER, PA/CDO

ANALYTES	SAMPLE REPORTED NUMBER	VALUE	TRUE VALUE	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
ALUMINUM	1	120	309	274- 335	ACCEPTABLE
ANTIMONY	2	8.65	5.58	3.30- 7.41	NOT ACCEPTABLE
ARSENIC	1	12.0	31.3	76.5- 103	ACCEPTABLE
BARIUM	2	390.	511	434- 588	NOT ACCEPTABLE
BERYLLIUM	1	0.90	0.933	0.690- 1.17	ACCEPTABLE
BORON	2	900. ±	864	710- 1010	ACCEPTABLE
CADMIUM	1	4.51	4.80	3.98- 5.76	ACCEPTABLE
CHROMIUM	1	63.8	58.1	57.9- 78.3	ACCEPTABLE
COPPER	1	778.	820	738- 902	ACCEPTABLE
LEAD	1	5.6	5.16	3.61- 6.71	ACCEPTABLE
MANGANESE	1	214.	221	203- 234	ACCEPTABLE
MERCURY	1	5.69	6.23	4.36- 8.10	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
SIGNIFICANT BIAS IS ANTICIPATED FOR THIS RESULT.

AR303142

PERFORMANCE EVALUATION REPORT
 WATER SUPPLY STUDY NUMBER W5032
 DATE: 3/10/93

LABORATORY PA009

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
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TRACE METALS IN MICROGRAMS PER LITER:

MOLIBDENUM	2	5.1	5.58	4.80- 8.57	ACCEPTABLE
NICKEL	1	100.	95.2	90.7- 109	ACCEPTABLE
SELENIUM	1	66.2	65.9	52.7- 79.1	ACCEPTABLE
SILVER	2	24.3	25.1	21.2- 29.2	ACCEPTABLE
THALLIUM	2	2.08	2.56	1.79- 3.33	ACCEPTABLE
VANADIUM	1	168.	160	143- 174	ACCEPTABLE
ZINC	1	90.0	83.8	73.7- 91.1	ACCEPTABLE

NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:

NITRATE AS N	1	3.2	3.60	3.24- 3.96	NOT ACCEPTABLE
NITRITE AS N	1	2.2	2.30	1.95- 2.64	ACCEPTABLE
FLUORIDE	1	2.05	2.00	1.40- 2.20	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

AR303143

DATE: 3/10/93

PERFORMANCE EVALUATION REPORT

WATER SUPPLY STUDY NUMBER 45032

LABORATORY 28004

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
INSECTICIDES IN MICROGRAMS PER LITER:					
ALACHLOR	5	3.66	2.33	1.28- 3.38	NOT ACCEPTABLE
ATRAZINE	5	6.14	7.20	3.46- 10.4	ACCEPTABLE
CHLORDANE (TOTAL)	3	4.85	5.33	2.72- 7.73	ACCEPTABLE
DEFTACHLOR	4	0.201	0.443	0.244-0.642	NOT ACCEPTABLE
DEPTACHLOR EPOXIDE	4	0.355	0.346	0.190-0.502	ACCEPTABLE
DETAACHLOROBENZENE	4	1.13	0.857	0.390- 1.17	ACCEPTABLE
DETAACHLOROCYCLOPENTADIENE	4	0.796	0.823	0.447- 1.13	ACCEPTABLE
LINDANE	1	0.205	0.214	0.114-0.310	ACCEPTABLE
NEBOTHYCHLOR	1	21.0	17.4	9.57- 25.2	ACCEPTABLE
NEOTOLACHLOR	6	7.20	11.8	5.93- 17.0	ACCEPTABLE
NEKIBUSIN	6	6.21	4.73	0.938- 7.42	ACCEPTABLE
SINAZINE	5	5.88	4.43	0.682- 8.54	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT BIAS IS ANTICIPATED FOR THIS RESULT.

PERFORMANCE EVALUATION REPORT
DATE: 1/10/91
WATER SUPPLY STUDY NUMBER 25032

LABORATORY 24009

ANALYTES	SAMPLE REPORTED NUMBER	TRUE VALUE	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
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INSECTICIDES IN MICROGRAMS PER LITER:

TOXAPHENE	2	5.53	1.71	2.00- 5.33	ND- ACCEPTABLE
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TRIFLURALIN	4	0.235	0.771	0.300- 1.02	ND- ACCEPTABLE
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HERBICIDES IN MICROGRAMS PER LITER:

2,4-D	1	12.0	19.6	7.30- 27.9	ACCEPTABLE
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2,4,5-TP (SILVEX)	1	5.66	9.31	4.15- 12.5	ACCEPTABLE
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DALAPON	2	3.23	12.5	0.1- 20.9	ACCEPTABLE
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DICAMBA	2	3.85	4.73	2.28- 7.05	ACCEPTABLE
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DINoseb	2	3.22	5.52	0.1- 9.19	ACCEPTABLE
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PENTACHLOROPHENOL	1	7.15	10.7	5.35- 16.0	ACCEPTABLE
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PICLORAN	2	5.80	10.6	0.1- 20.0	ACCEPTABLE
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POLYCHLORINATED BIPHENYLS IN MICROGRAMS PER LITER:

DICHLOROBIPHENYL	1	0.89	0.959	0.1- 1.92	ACCEPTABLE
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BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
SIGNIFICANT BIAS IS ANTICIPATED FOR THIS RESULT.
S.D.L.
STANDS FOR DETECTION LIMIT

AR303145

PERFORMANCE EVALUATION REPORT
DATE: 1/10/93
WATER SUPPLY STUDY NUMBER 45032

LABORATORY PA009

ANALYSIS	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
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PAN'S IN MICROGRAMS PER LITER:

BENZO (A) PYRENE	1	0.211	0.337	0.0287-0.525	ACCEPTABLE
BENZO (K) FLUORANTHENE	1	0.112	0.200	0.0261-0.289	ACCEPTABLE
DIBENZO (A,H) ANTHRACENE	1	0.046	0.169	0.0193-0.302	ACCEPTABLE
PHENANTHRENE	1	22.8	21.8	3.13- 29.2	ACCEPTABLE
PYRENE	1	1.30	1.26	0.454- 1.81	ACCEPTABLE

ADIPATE/PHTHALATES IN MICROGRAMS PER LITER:

BIS(2-ETHYLHEXYL)ADIPATE	9.38	10.6	0.1- 18.0	ACCEPTABLE
BIS(2-ETHYLHEXYL)PHTHALATE	9.16	9.28	3.236- 17.0	ACCEPTABLE
BUTYLBENZYL PHTHALATE	5.96	5.20	2.36- 8.50	ACCEPTABLE
DI-N-BUTYL PHTHALATE	22.2	22.6	7.39- 10.2	ACCEPTABLE
DIEETHYL PHTHALATE	7.38	9.22	3.66- 12.6	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
SIGNIFICANT BIAS IS ANTICIPATED FOR THIS RESULT.
D.L. STANDS FOR DETECTION LIMIT

AR303146

PERFORMANCE EVALUATION REPORT
DATE: 8/10/93
WATER SUPPLY STUDY NUMBER 45032

LABORATORY PROOF

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TYPE VALUE	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
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MISCELLANEOUS SOC'S IN MICROGRAMS PER LITER:

DICUAT	1	38.9	28.2	0.L.- 52.0	ACCEPTABLE
ENDOTHALL	1	190.	245	0.L.- 562	ACCEPTABLE
GLYPHOSATE	1	511.	447	298- 579	ACCEPTABLE

TRINHALONETHANES IN MICROGRAMS PER LITER:

BROMODICHLOROMETHANE	1	22.6	22.4	17.3- 26.2	ACCEPTABLE
BROMOFORM	1	30.0	26.4	21.1- 31.7	ACCEPTABLE
CHLORODIBROMOMETHANE	1	19.5	17.9	14.3- 21.5	ACCEPTABLE
CHLOROFORM	1	28.3	17.1	13.7- 20.5	ACCEPTABLE
TOTAL TRINHALONETHANES	1	89.40	33.3	67.0- 101	ACCEPTABLE

VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:

BENZENE	1	17.6	16.5	13.2- 19.3	ACCEPTABLE
CARBON TETRACHLORIDE	1	15.0	14.5	11.6- 17.4	ACCEPTABLE

ALL STANDS FOR DETECTION LIMIT
BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

AR303147

PERFORMANCE EVALUATION REPORT
DATE: 4/10/93
WATER SUPPLY STUDY NUMBER 25032

LABORATORY FACILITY

ANALYTES	SAMPLE REPORTED NUMBER	TRUE VALUE	ACCEPTANCE LIMITS	PERFORMANCE EVALUATION
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:				
CHLOROBENZENE	2	13.1	13.5 10.9- 16.2	ACCEPTABLE
1,1-DICHLOROBENZENE	2	11.6	13.5 10.1- 16.2	ACCEPTABLE
1,4-DICHLOROBENZENE	1	12.6	13.6 10.9- 16.1	ACCEPTABLE
1,1-DICHLOROETHANE	1	13.1	13.3 10.6- 16.0	ACCEPTABLE
1,1-DICHLOROETHYLENE	1	10.0	9.13 5.88- 12.8	ACCEPTABLE
C 1,2 DICHLOROETHYLENE	2	12.1	12.3 9.88- 14.8	ACCEPTABLE
T 1,2 DICHLOROETHYLENE	2	16.2	16.9 13.5- 20.3	ACCEPTABLE
1,2 DICHLOROPROPANE	2	5.83	6.46 3.88- 9.08	ACCEPTABLE
ETHYLENE	2	12.1	11.8 7.88- 14.2	ACCEPTABLE
STYRENE	2	3.35	3.66 5.22- 12.14	ACCEPTABLE
TETRACHLOROETHYLENE	2	7.03	7.43 4.46- 10.4	ACCEPTABLE
TOLUENE	2	6.26	6.54 3.02- 9.16	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

AR303148

PERFORMANCE EVALUATION 17P087
DATE: 1/10/91
WATER SUPPLY STUDY NUMBER 45732

LABORATORY PA009

ANALITES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:					
1,1,1-TRICHLOROETHANE	1	9.85	10.1	8.08- 12.1	ACCEPTABLE
TRICHLOROETHYLENE	1	11.2	11.2	9.96- 13.4	ACCEPTABLE
VINYL CHLORIDE	1	2.63	2.57	1.54- 3.60	ACCEPTABLE
TOTAL XYLENES	2	7.07	7.54	4.52- 10.6	ACCEPTABLE
BROMOETHANE	3	16.1	16.0	7.98- 22.3	ACCEPTABLE
1,2-DIBROMO-3-CHLOROPROPANE	4	1.87	1.78	1.07- 2.49	ACCEPTABLE
DICHLOROMETHANE	3	7.96	7.77	5.45- 10.2	ACCEPTABLE
ETHYLENE DIBROMIDE (SOB)	4	2.12	2.29	1.37- 3.21	ACCEPTABLE
HEXACHLOROBTADIENE	3	21.0	19.3	14.1- 23.3	ACCEPTABLE
1,2,4-TRICHLOROBENZENE	3	14.2	14.1	9.90- 17.1	ACCEPTABLE
1,1,2-TRICHLOROETHANE	3	12.8	13.2	9.58- 15.7	ACCEPTABLE
1,2,3-TRICHLOROPROPANE	3	10.5	9.65	5.36- 12.0	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

AR303149

DATE: 3/19/91

PERFORMANCE EVALUATION REPORT

WATER SUPPLY STUDY NUMBER V5032

LABORATORY PROOF

ANALYTES	SAMPLE REPORTED NUMBER	VALUE	TEST VALUE	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
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MISCELLANEOUS ANALYTES:

RESIDUAL FREE CHLORINE 1 0.69 20 1.09 0.205- 1.22 NOT ACCEPTABLE

TURBIDITY 1 4.0 20 4.10 1.75- 4.07 ACCEPTABLE

TOTAL FILTERABLE RESIDUE 1 376. 20 275 271- 463 ACCEPTABLE

CALCIUM 1 150. 20 160 149- 172 ACCEPTABLE

PH-UNITS 1 8.35 9.12 8.35- 9.33 ACCEPTABLE

ALKALINITY 1 30.4 20 29.0 27.0- 33.6 ACCEPTABLE

CORROSIVITY 1 0.69 0.246 0.465- 1.17 ACCEPTABLE

SODIUM 1 13.0 13.3 11.9- 14.8 ACCEPTABLE

SULFATE 1 27.3 27.3 24.7- 29.4 ACCEPTABLE

TOTAL CYANIDE 1 0.344 0.400 0.300-0.500 ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT BIAS IS ANTICIPATED FOR THIS RESULT.

AR303150

Section No. 12
Revision No.
Date: 02/16/94
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REGION 3
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR Q3 1 FY 93

LABORATORY: Lancaster Laboratories (PA)
PERFORMANCE: ACCEPTABLE - No Response Required
RANK: Above = 0 Same = 3 Below = 38

X SCORE: 100
REPORT DATE: 12/24/92
MATRIX: WATER

COMPOUND	TOLERANCE INTERVALS				LABORATORY DATA		#LABS MIS-OUT	PROGRAM #LABS NOT-ID	DATA #LABS ID-CPD	TOTAL #LABS
	WARNING LOWER	UPPER	ACTION LOWER	UPPER	CONC	Q				
TCL VOLATILE										
CHLOROMETHANE	35	71	29	91	51		2	1	58	59
1,1-DICHLOROETHANE	NU	NU	NU	NU	11		0	0	59	59
CHLOROFORM	61	75	59	83	71		1	0	59	59
2-BUTANONE	71	110	66	110	110		15	2	57	59
CIS-1,3-DICHLOROPROPENE	66	87	63	98	89	S	3	1	58	59
BROMOFORM	57	74	54	77	68		8	0	59	59
2-HEXANONE	110	250	92	270	210		3	0	59	59
1,1,2,2-TETRACHLOROETHANE	120	160	110	160	140		5	0	59	59
CHLOROBENZENE	34	41	34	44	39		3	0	59	59
STYRENE	160	200	150	210	180		3	0	59	59
XYLENES (TOTAL)	73	92	70	100	88		2	3	56	59
TCL SEMIVOLATILE										
PHENOL	17	28	16	29	24		4	1	58	59
BIS(2-CHLOROETHYL)ETHER	32	46	30	54	42		3	0	59	59
4-METHYLPHENOL	23	34	21	40	29		6	0	59	59
HEXACHLOROETHANE	33	60	28	76	47		0	0	59	59
2,4-DIMETHYLPHENOL	17	30	15	38	23		6	2	57	59
BIS(2-CHLOROETHOXY)METHANE	20	25	19	28	24		11	0	59	59
1,2,4-TRICHLOROBENZENE	28	43	26	51	38		2	0	59	59
HEXACHLOROCHLOROPENTADIENE	NU	NU	NU	NU	10 U		0	31	28	59
2,4,6-TRICHLOROPHENOL	21	31	20	32	28		7	0	59	59
4-NITROPHENOL	41	64	38	67	63		11	1	58	59
4-BROMOPHENYL PHENYL ETHER	13	22	12	24	20		0	0	59	59
HEXACHLOROBENZENE	34	44	32	49	40		5	0	59	59
ANTHRACENE	NU	NU	NU	NU	10		0	0	59	59
PYRENE	74	140	65	180	120		3	0	59	59
BUTYL BENZYL PHTHALATE	38	63	35	67	53		9	0	59	59
BENZO(A)PYRENE	25	43	22	52	35		5	0	59	59
TCL PESTICIDES										
ALPHA-BHC	0.16	0.22	0.16	0.23	0.19		10	1	58	59
BETA-BHC	0.16	0.24	0.14	0.26	0.23		4	4	55	59
GAMMA-BHC (LINDANE)	0.15	0.22	0.14	0.23	0.2		6	0	59	59
HEPTACHLOR	0.29	0.43	0.27	0.45	0.34		8	1	58	59
ALDRIN	0.12	0.2	0.11	0.21	0.16		5	0	59	59
HEPTACHLOR EPOXIDE	0.31	0.43	0.29	0.44	0.35		7	1	58	59
ENDOSULFAN I	0.21	0.38	0.19	0.48	0.31		4	1	58	59
ENDOSULFAN II	0.43	0.7	0.39	0.84	0.63		2	1	58	59
ENDOSULFAN SULFATE	0.82	1.3	0.74	1.4	1.2		4	1	58	59
4,4'-DDT	0.95	1.5	0.87	1.5	1.4		6	0	59	59
ENDRIX KETONE	0.68	1.1	0.62	1.1	0.83		6	1	58	59
NON-TCL VOLATILE										
EPICHLOROHYDRIN						0 NR		59	0	59

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REGION 3
ORGANIC PERFORMANCE EVALUATION SAMPLE
INDIVIDUAL LABORATORY SUMMARY REPORT
FOR Q3 1 FY 93

LABORATORY: Lancaster Laboratories (PA)
PERFORMANCE: ACCEPTABLE - No Response Required
RANK: Above = 0 Same = 3 Below = 38

X SCORE: 100
REPORT DATE: 12/24/92
MATRIX: WATER

COMPOUND	TOLERANCE INTERVALS				LABORATORY		#LABS MIS-QNT	PROGRAM	DATA		TOTAL #LABS
	WARNING		ACTION		DATA			#LABS	#LABS		
	LOWER	UPPER	LOWER	UPPER	CONC	Q		NOT-ID	ID-CPD		
PROPANE,1,2-DIBROMO-3-CHLORO-					12			23	36	59	
TOLUENE,2-CHLORO-					69			7	52	59	
NON-TCL SEMIVOLATILE											
4,4'-DDT					44			15	44	59	
TCL VOLATILE (Contaminants)											
ACETONE					6			33	26	59	
TRICHLOROETHENE					1			28	31	59	
TCL PESTICIDES (Contaminants)											
4,4'-DDE					0.011			49	10	59	
NON-TCL VOLATILE (Contaminants)											
2-PROPANOL					140			23	36	59	
NON-TCL SEMIVOLATILE (Contaminants)											
UNKNOWN					2			37	22	59	

OF TCL COMPOUNDS NOT-IDENTIFIED: 0
OF TCL COMPOUNDS MIS-QUANTIFIED: 0
OF TCL CONTAMINANTS: 0

OF NON-TCL COMPOUNDS NOT-IDENTIFIED: 0
OF NON-TCL CONTAMINANTS: 0

AR303152

Program Summary Data (cont.):

<u>Header</u>	<u>Definition</u>
# LABS NOT-ID:	The number of CLP contractors who did not identify a TCL or non-TCL compound added to the PEM.
# LABS ID-CPD:	The number of CLP contractors who identified a TCL or non-TCL compound in the PEM.
TOTAL # LABS:	The number of CLP contractors who analyzed the PEM.
ILSR CODES:	The following codes are used on the ILSR. U -- Compound analyzed for but not detected. & -- Compound not identified -- points deducted for identification. X -- Compound correctly identified but the reported value is not within the action limit -- points deducted for quantification. \$ -- The reported value for the compound is not within the warning limit but is within the action limit -- points not deducted. C -- Contaminant -- points deducted. CO -- Contaminant which may have been introduced during preparation of the PEM or during shipment -- points not deducted. NS -- Data required but not submitted -- points deducted. NR -- Data not required. NU -- Data not used; insufficient amount of usable data for scoring submitted by the contractors.

AR303153

USEPA Water Supply Performance Evaluation

DATE: 2/ 3/93

WATER SUPPLY STUDY NUMBER WS031

MOUNTAIN STATES ANALYTICAL
8019730050 SALT LAKE CITY, UT jd

LABORATORY UT028

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
ALUMINUM	1	80	76.3	62.6- 93.2	ACCEPTABLE
ARSENIC	1	65.0	70.2	58.2- 80.2	ACCEPTABLE
BARIUM	2	710	681	579- 783	ACCEPTABLE
BERYLLIUM	1	3.5	3.27	2.78- 3.76	ACCEPTABLE
BORON	2	801	720	652- 814	ACCEPTABLE
CADMIUM	1	15	12.8	10.2- 15.4	ACCEPTABLE
CHROMIUM	1	85.4	81.6	69.4- 93.8	ACCEPTABLE
COPPER	1	115	110	99.0- 121	ACCEPTABLE
LEAD	1	12.6	12.4	8.68- 16.1	ACCEPTABLE
MANGANESE	1	17.5 **	17.0	13.8- 18.7	ACCEPTABLE
MERCURY	1	9.45	0.908	0.636- 1.18	NOT ACCEPTABLE
MOLYBDENUM	2	45	42.3	29.2- 54.3	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.

USEPA Water Supply Performance Evaluation

DATE: 2/ 3/93

WATER SUPPLY STUDY NUMBER WS031

LABORATORY UT028

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
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TRACE METALS IN MICROGRAMS PER LITER:

NICKEL	1	70	68.0	57.8- 78.2	ACCEPTABLE
SELENIUM	1	24.6	22.9	18.3- 27.5	ACCEPTABLE
LEAD	2	113	109	92.4- 123	ACCEPTABLE
THALLIUM	2	1.23	1.48	0.822- 2.26	ACCEPTABLE
VANADIUM	1	25.7	24.2	20.2- 27.5	ACCEPTABLE
ZINC	1	198	179	161- 190	NOT ACCEPTABLE

NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:

NITRATE AS N	1	7.44	6.50	5.85- 7.15	NOT ACCEPTABLE
NITRITE AS N	1	0.407	0.430	0.366-0.494	ACCEPTABLE
FLUORIDE	1	5.6	5.70	5.13- 6.27	ACCEPTABLE

INSECTICIDES IN MICROGRAMS PER LITER:

ALACHLOR	5	3.26	2.50	1.38- 3.62	ACCEPTABLE
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BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

USEPA Water Supply Performance Evaluation

DATE: 2/ 3/93

WATER SUPPLY STUDY NUMBER WS031

LABORATORY UT028

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
INSECTICIDES IN MICROGRAMS PER LITER:					
ATRAZINE	5	11.6	9.39	5.16- 13.6	ACCEPTABLE
BROMACIL	6	33.4 **	22.4	D.L.- 36.1	ACCEPTABLE
CHLORDANE	3	4.17	5.16	2.84- 7.48	ACCEPTABLE
ENDRIN	1	0.728	0.699	0.489-0.909	ACCEPTABLE
HEPTACHLOR	4	1.50	1.44	0.792- 2.09	ACCEPTABLE
HEPTACHLOR EPOXIDE	4	1.68	1.92	1.06- 2.78	ACCEPTABLE
HEXACHLOROBENZENE	4	1.68 **	2.40	0.518- 2.95	ACCEPTABLE
HEXACHLOROCYCLOPENTADIEN ⁴		1.25 **	1.11	.0517- 1.67	ACCEPTABLE
LINDANE	1	0.795	0.971	0.534- 1.41	ACCEPTABLE
METHOXYCHLOR	1	14.0	12.9	7.10- 18.7	ACCEPTABLE
METOLACHLOR	6	18.4 **	18.6	4.85- 26.1	ACCEPTABLE
METRIBUZIN	6	12.8 **	6.30	0.819- 9.25	NOT ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.
D.L. STANDS FOR DETECTION LIMIT

USEPA Water Supply Performance Evaluation

DATE: 2/ 3/93

WATER SUPPLY STUDY NUMBER WS031

LABORATORY UT028

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
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INSECTICIDES IN MICROGRAMS PER LITER:

PROMETON	6	15.1	12.7	1.12- 20.6	ACCEPTABLE
SIMAZINE	5	19.2	12.5	0.540- 22.5	ACCEPTABLE
TOXAPHENE	2	3.99	3.31	1.82- 4.80	ACCEPTABLE
TRIFLURALIN	4	1.03	** 0.857	0.176- 1.01	NOT ACCEPTABLE

HERBICIDES IN MICROGRAMS PER LITER:

2,4-D	1	11.6	20.3	10.2- 30.4	ACCEPTABLE
2,4,5-TP (SILVEX)	1	8.86	8.66	4.33- 13.0	ACCEPTABLE
BENTAZON	2	21.2	12.7	D.L.- 21.4	ACCEPTABLE
DALAPON	2	23.4	** 22.3	D.L.- 31.5	ACCEPTABLE
DICAMBA	2	12.7	** 9.43	0.778- 14.2	ACCEPTABLE
DINOSEB	2	22.4	** 18.3	D.L.- 26.1	ACCEPTABLE
TOTAL DCPA	2	7.58	** 11.3	D.L.- 17.9	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.
D.L. STANDS FOR DETECTION LIMIT

USEPA Water Supply Performance Evaluation

DATE: 2/ 3/93

WATER SUPPLY STUDY NUMBER WS031

LABORATORY UT028

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
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HERBICIDES IN MICROGRAMS PER LITER:

PENTACHLOROPHENOL	1	6.40	11.4	5.70- 17.1	ACCEPTABLE
PICLORAM	2	64.9 **	26.7	D.L.- 42.5	NOT ACCEPTABLE

TRIALOMETHANES IN MICROGRAMS PER LITER:

BROMODICHLOROMETHANE	1	37.3	36.9	29.5- 44.3	ACCEPTABLE
BROMOFORM	1	49.3	43.7	35.0- 52.4	ACCEPTABLE
CHLORODIBROMOMETHANE	1	31.6	31.8	25.4- 38.2	ACCEPTABLE
CHLOROFORM	1	48.9	48.4	38.7- 58.1	ACCEPTABLE
TOTAL TRIHALOMETHANE	1	167.1	160.8	129- 193	ACCEPTABLE

VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:

BENZENE	1	13.8	12.6	10.1- 15.1	ACCEPTABLE
CARBON TETRACHLORIDE	1	8.05	8.69	5.21- 12.2	ACCEPTABLE
CHLOROBENZENE	2	7.75	7.68	4.61- 10.8	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.
D.L. STANDS FOR DETECTION LIMIT

USEPA Water Supply Performance Evaluation

DATE: 2/ 3/93

WATER SUPPLY STUDY NUMBER WS031

LABORATORY UT028

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:					
1,2 DICHLOROBENZENE	2	13.4	16.3	13.0- 19.6	ACCEPTABLE
1,4-DICHLOROBENZENE	1	8.88	9.40	5.64- 13.2	ACCEPTABLE
1,2-DICHLOROETHANE	1	9.61	9.25	5.55- 12.9	ACCEPTABLE
1,1-DICHLOROETHYLENE	1	7.36	7.02	4.21- 9.83	ACCEPTABLE
C 1,2 DICHLOROETHYLENE	2	12.4	14.5	11.6- 17.4	ACCEPTABLE
T 1,2 DICHLOROETHYLENE	2	8.75	10.1	8.08- 12.1	ACCEPTABLE
1,2 DICHLOROPROPANE	2	13.1	12.7	10.2- 15.2	ACCEPTABLE
ETHYLBENZENE	2	8.58	9.27	5.56- 13.0	ACCEPTABLE
STYRENE	2	10.2	11.4	9.12- 13.7	ACCEPTABLE
TETRACHLOROETHYLENE	2	10.1	11.6	9.28- 13.9	ACCEPTABLE
TOLUENE	2	13.6	15.3	12.2- 18.4	ACCEPTABLE
1,1,1-TRICHLOROETHANE	1	11.7	13.0	10.4- 15.6	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

USEPA Water Supply Performance Evaluation

DATE: 2/ 3/93

WATER SUPPLY STUDY NUMBER WS031

LABORATORY UT028

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
VOLATILE ORGANIC COMPOUNDS IN MICROGRAMS PER LITER:					
TRICHLOROETHYLENE	1	6.67	7.46	4.48- 10.4	ACCEPTABLE
VINYL CHLORIDE	1	11.1	11.9	7.14- 16.7	ACCEPTABLE
TOTAL XYLENES	2	12.4	13.2	10.6- 15.8	ACCEPTABLE
1,2DIBROMO3CHLOROPROPANE	4	2.49	2.65	1.59- 3.71	ACCEPTABLE
2,2-DICHLOROPROPANE	3	5.46	15.7	12.6- 18.8	NOT ACCEPTABLE
1,1-DICHLOROPROPENE	3	7.86	7.31	4.39- 10.2	ACCEPTABLE
ETHYLENE DIBROMIDE (EDB)	4	0.720	0.637	0.382-0.892	ACCEPTABLE
FLUOROTRICHLOROMETHANE	3	14.0	12.6	10.1- 15.1	ACCEPTABLE
N-PROPYLBENZENE	3	11.8	11.7	9.36- 14.0	ACCEPTABLE
1,3,5-TRIMETHYLBENZENE	3	11.3	8.60	5.16- 12.0	ACCEPTABLE

MISCELLANEOUS ANALYTES:

RESIDUAL FREE CHLORINE (MILLIGRAMS PER LITER)	1	0.333	** 0.360	0.160-0.451	ACCEPTABLE
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* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.

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USEPA Water Supply Performance Evaluation

DATE: 2/ 3/93

WATER SUPPLY STUDY NUMBER WS031

LABORATORY DT028

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
MISCELLANEOUS ANALYTES:					
TURBIDITY (NTU'S)	1	3.25	3.00	2.55- 3.57	ACCEPTABLE
TOTAL FILTERABLE RESIDUE (MILLIGRAMS PER LITER)	1	468	** 406	283- 618	ACCEPTABLE
CALCIUM (MG. CaCO3/L)	1	216	230	214- 244	ACCEPTABLE
PH-UNITS	1	9.10	9.13	8.84- 9.34	ACCEPTABLE
ALKALINITY (MG. CaCO3/L)	1	41.0	** 46.0	43.1- 52.0	NOT ACCEPTABLE
CORROSIVITY (LANGELIER IND. AT 20C)	1	1.15	1.19	0.794- 1.49	ACCEPTABLE
SODIUM (MILLIGRAMS PER LITER)	1	20.0	21.1	19.2- 23.0	ACCEPTABLE
SULFATE (MILLIGRAMS PER LITER)	1	10.1	8.60	6.44- 10.6	ACCEPTABLE
TOTAL CYANIDE (MILLIGRAMS PER LITER)	1	0.346	0.270	0.202-0.337	NOT ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.

USEPA Water Pollution Performance Evaluation

DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

MOUNTAIN STATES ANALYTICAL
8019730050 / SALT LAKE CITY, UT / JD

LABORATORY: UT028

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
ALUMINUM	1	1090	1100	898- 1300	949- 1250	ACCEPTABLE
	2	4200	4000	3370- 4570	3520- 4410	ACCEPTABLE
ARSENIC	1	278	280	225- 334	238- 320	ACCEPTABLE
	2					
BERYLLIUM	1	62.6	63.0	51.1- 74.5	54.1- 71.5	ACCEPTABLE
	2					
CADMIUM	1	8.58	8.12	6.30- 10.3	6.80- 9.79	ACCEPTABLE
	2	95.6	93.9	78.3- 110	82.2- 106	ACCEPTABLE
COBALT	1	483	480	416- 536	431- 521	ACCEPTABLE
	2	242	240	206- 275	214- 266	ACCEPTABLE
CHROMIUM	1	65.3	62.0	49.2- 73.7	52.3- 70.6	ACCEPTABLE
	2	480	460	378- 533	397- 514	ACCEPTABLE
COPPER	1	66.9	62.0	53.5- 69.8	55.6- 67.8	ACCEPTABLE
	2	418	410	365- 462	377- 450	ACCEPTABLE
IRON	1	3800	3800	3350- 4230	3460- 4120	ACCEPTABLE
	2	885	860	755- 963	781- 937	ACCEPTABLE
MERCURY	1	0.94	0.983	0.620- 1.42	0.719- 1.32	ACCEPTABLE
	2	1.90	2.10	1.57- 2.75	1.72- 2.61	ACCEPTABLE
MANGANESE	1	2190	2200	1950- 2450	2010- 2380	ACCEPTABLE
	2	220	221	196- 244	202- 238	ACCEPTABLE
NICKEL	1	128	130	111- 150	116- 145	ACCEPTABLE
	2	1320	1300	1160- 1450	1200- 1420	ACCEPTABLE
LEAD	1	78.8	79.2	62.7- 97.1	67.0- 92.8	ACCEPTABLE
	2	453	450	393- 513	408- 498	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

USEPA Water Pollution Performance Evaluation

DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: UT028

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
TRACE METALS IN MICROGRAMS PER LITER:						
SELENIUM	1	22.9	23.0	14.3- 29.1	16.1- 27.3	ACCEPTABLE
	2	77.6	78.1	52.8- 94.6	58.1- 89.3	ACCEPTABLE
VANADIUM	1	7930	8000	7110- 8830	7330- 8610	ACCEPTABLE
	2	15200	15000	12700-17400	13300-16800	ACCEPTABLE
ZINC	1	1100	1100	961- 1220	993- 1190	ACCEPTABLE
	2	247	240	209- 271	216- 263	ACCEPTABLE
ANTIMONY	3	140	116	79.4- 140	87.2- 133	CHECK FOR ERROR
	4	17.3	14.0	7.01- 20.4	8.73- 18.7	ACCEPTABLE
SILVER	3	2.45	2.39	1.80- 2.96	1.95- 2.82	ACCEPTABLE
	4	7.60	9.75	7.80- 11.5	8.25- 11.0	NOT ACCEPTABLE
THALLIUM	3	80.4	90.2	70.7- 108	75.5- 103	ACCEPTABLE
	4	8.25	9.00	6.71- 11.3	7.29- 10.7	ACCEPTABLE
MOLYBDENUM	3	9.40	6.48	3.34- 8.82	4.04- 8.12	NOT ACCEPTABLE
	4	49.8	39.0	30.3- 47.9	32.6- 45.6	NOT ACCEPTABLE
STRONTIUM	3	3.79	4.01	3.01- 4.99	3.26- 4.73	ACCEPTABLE
	4	47.0	51.0	41.4- 60.1	43.8- 57.7	ACCEPTABLE
TITANIUM	3	63.3	66.0	51.5- 76.5	54.7- 73.3	ACCEPTABLE
	4	174	182	149- 205	156- 198	ACCEPTABLE
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
PH-UNITS	3	8.82	8.70	8.31- 9.05	8.40- 8.96	ACCEPTABLE
	4	6.13	6.10	5.96- 6.22	5.99- 6.19	ACCEPTABLE
SPEC. COND. (UMHOS/CM AT 25 C)	1	260	253	226- 274	232- 268	ACCEPTABLE
	2	873	868	819- 916	831- 904	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

USEPA Water Pollution Performance Evaluation

DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: UT028

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
MINERALS IN MILLIGRAMS PER LITER: (EXCEPT AS NOTED)						
TDS AT 180 C	1	96.0	116	76.2- 166	87.5- 155	ACCEPTABLE
	2	445	480	385- 617	414- 588	ACCEPTABLE
TOTAL HARDNESS (AS CaCO ₃)	1	69.5	75.6	66.7- 84.1	68.8- 82.0	ACCEPTABLE
	2	227	225	209- 242	213- 238	ACCEPTABLE
CALCIUM	1	3.88	3.69	3.00- 4.47	3.18- 4.29	ACCEPTABLE
	2	85.7	80.9	73.4- 90.2	75.5- 88.1	ACCEPTABLE
MAGNESIUM	1	17.1	16.1	14.0- 18.1	14.5- 17.6	ACCEPTABLE
	2	5.84	5.64	4.84- 6.32	5.03- 6.13	ACCEPTABLE
SODIUM	1	17.0	15.9	14.0- 17.9	14.5- 17.4	ACCEPTABLE
	2	69.5	65.6	59.6- 72.0	61.2- 70.4	ACCEPTABLE
POTASSIUM	1	2.54	2.60	2.05- 3.22	2.19- 3.08	ACCEPTABLE
	2	18.8	19.0	16.2- 21.9	16.9- 21.1	ACCEPTABLE
TOTAL ALKALINITY (AS CaCO ₃)	1	23.5	21.1	17.2- 26.1	18.3- 25.0	ACCEPTABLE
	2	98.5	97.0	85.0- 109	88.0- 106	ACCEPTABLE
CHLORIDE	1	54.1	54.3	48.2- 59.1	49.6- 57.8	ACCEPTABLE
	2	172	178	166- 191	170- 188	ACCEPTABLE
FLUORIDE	1	2.64	2.40	2.09- 2.65	2.16- 2.58	CHECK FOR ERROR
	2	0.262	0.230	0.175-0.286	0.189-0.272	ACCEPTABLE
SULFATE	1	8.40	9.10	6.48- 11.4	7.10- 10.8	ACCEPTABLE
	2	39.1	42.0	35.2- 48.1	36.8- 46.5	ACCEPTABLE

NUTRIENTS IN MILLIGRAMS PER LITER:

AMMONIA-NITROGEN	1	5.41	5.50	4.35- 6.65	4.62- 6.37	ACCEPTABLE
	2	9.58	9.80	7.80- 11.6	8.25- 11.2	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY

USEPA Water Pollution Performance Evaluation

DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: UT028

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
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NUTRIENTS IN MILLIGRAMS PER LITER:

NITRATE-NITROGEN	1	35.3	34.0	27.5- 40.2	29.0- 38.7	ACCEPTABLE
	2	6.93	7.10	5.70- 8.43	6.03- 8.10	ACCEPTABLE
ORTHOPHOSPHATE	1	0.840	0.830	0.692-0.961	0.724-0.929	ACCEPTABLE
	2	0.102	0.090	.0617-0.122	.0689-0.115	ACCEPTABLE
KJELDAHL-NITROGEN	3	1.44	9.30	6.67- 11.5	7.26- 10.9	NOT ACCEPTABLE
	4	18.4	19.0	13.9- 23.1	15.0- 22.0	ACCEPTABLE
TOTAL PHOSPHORUS	3	2.99	3.20	2.35- 3.57	2.49- 3.42	ACCEPTABLE
	4	1.62	1.60	1.25- 1.94	1.33- 1.86	ACCEPTABLE

DEMANDS IN MILLIGRAMS PER LITER:

COD	1	14.7	21.8	12.6- 30.5	14.9- 28.2	CHECK FOR ERROR
	2	29.9	35.4	23.6- 43.0	26.0- 40.5	ACCEPTABLE
5-DAY BOD	1	12.4	14.0	7.36- 20.7	9.03- 19.0	ACCEPTABLE
	2	20.3	21.8	11.8- 31.9	14.3- 29.4	ACCEPTABLE
CARBONACEOUS BOD	1	11.3	12.0	2.81- 21.2	5.34- 18.7	ACCEPTABLE
	2	15.5	19.5	6.28- 32.4	9.86- 28.8	ACCEPTABLE

PCB'S IN MICROGRAMS PER LITER:

PCB-AROCLO 1016/1242	2	5.22	4.29	1.86- 5.71	2.35- 5.22	ACCEPTABLE
PCB-AROCLO 1232	1	1.54	1.43	0.657- 1.79	0.800- 1.64	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

USEPA Water Pollution Performance Evaluation

DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: UT028

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
PCB'S IN OIL IN MILLIGRAMS PER KILOGRAM:						
PCB IN OIL- 1016/1242	1	21.5	21.5	5.04- 27.6	7.92- 24.7	ACCEPTABLE
PCB IN OIL- 1260	2	30.9	36.6	7.82- 57.8	14.2- 51.4	ACCEPTABLE
PESTICIDES IN MICROGRAMS PER LITER:						
CHLORDANE	3	0.994	0.964	0.469- 1.32	0.575- 1.21	ACCEPTABLE
	4	10.9	9.48	5.38- 12.4	6.26- 11.5	ACCEPTABLE
ALDRIN	1	0.198	0.159	.0344-0.214	.0572-0.191	CHECK FOR ERROR
	2	0.541	0.444	.0957-0.577	0.156-0.517	CHECK FOR ERROR
DIELDRIN	1	0.105	0.121	.0572-0.163	.0704-0.150	ACCEPTABLE
	2	0.588	0.553	0.270-0.750	0.330-0.690	ACCEPTABLE
DDD	1	0.191	0.216	.0863-0.317	0.115-0.288	ACCEPTABLE
	2	0.712	0.626	0.334-0.865	0.400-0.799	ACCEPTABLE
DDE	1	0.120	0.131	.0562-0.171	.0706-0.157	ACCEPTABLE
	2	0.549	0.495	0.228-0.699	0.288-0.639	ACCEPTABLE
DDT	1	0.166	0.186	.0628-0.284	.0905-0.257	ACCEPTABLE
	2	0.624	0.576	0.252-0.844	0.326-0.770	ACCEPTABLE
HEPTACHLOR	1	0.139	0.157	.0488-0.221	.0706-0.199	ACCEPTABLE
	2	0.562	0.514	0.180-0.715	0.247-0.648	ACCEPTABLE
HEPTACHLOR EPOXIDE	1	0.067	0.087	.0427-0.120	.0526-0.110	ACCEPTABLE
	2	0.375	0.375	0.189-0.513	0.229-0.473	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY

USEPA Water Pollution Performance Evaluation

DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: UT028

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE HALOCARBONS IN MICROGRAMS PER LITER:						
1,2 DICHLOROETHANE	1	54.0	48.6	34.5- 62.8	38.0- 59.2	ACCEPTABLE
	2	10.6	10.2	7.28- 13.8	8.11- 12.9	ACCEPTABLE
CHLOROFORM	1	45.2	45.7	31.6- 59.5	35.1- 56.0	ACCEPTABLE
	2	10.9	13.8	9.42- 18.0	10.5- 16.9	ACCEPTABLE
1,1,1 TRICHLOROETHANE	1	54.5	52.0	32.3- 67.9	36.8- 63.4	ACCEPTABLE
	2	9.15	9.34	5.56- 12.6	6.46- 11.7	ACCEPTABLE
TRICHLOROETHENE	1	33.1	38.8	26.8- 49.1	29.6- 46.2	ACCEPTABLE
	2	7.29	9.91	6.52- 13.0	7.34- 12.2	CHECK FOR ERROR
CARBONTETRACHLORIDE	1	51.2	46.3	29.8- 63.7	34.1- 59.4	ACCEPTABLE
	2	13.3	13.5	8.93- 18.2	10.1- 17.0	ACCEPTABLE
TETRACHLOROETHENE	1	55.8	57.2	39.7- 71.9	43.8- 67.8	ACCEPTABLE
	2	11.9	16.2	10.9- 21.1	12.2- 19.8	CHECK FOR ERROR
BROMODICHLOROMETHANE	1	49.4	49.5	34.2- 64.3	38.0- 60.5	ACCEPTABLE
	2	5.63	7.75	4.88- 10.6	5.59- 9.86	ACCEPTABLE
DIBROMOCHLOROMETHANE	1	45.7	42.2	30.0- 54.4	33.1- 51.3	ACCEPTABLE
	2	15.6	16.4	10.9- 21.5	12.2- 20.2	ACCEPTABLE
BROMOFORM	1	58.9	53.7	33.5- 73.7	38.6- 68.6	ACCEPTABLE
	2	11.2	11.9	6.48- 17.1	7.83- 15.7	ACCEPTABLE
METHYLENE CHLORIDE	1	34.9	37.3	24.1- 53.2	27.7- 49.6	ACCEPTABLE
	2	4.91	8.77	4.21- 13.5	5.39- 12.3	CHECK FOR ERROR
CHLOROBENZENE	1	43.6	43.2	30.8- 55.0	33.9- 51.9	ACCEPTABLE
	2	11.6	12.9	8.99- 16.7	9.97- 15.7	ACCEPTABLE

VOLATILE AROMATICS IN MICROGRAMS PER LITER:

BENZENE	1	8.09	10.3	7.34- 13.4	8.11- 12.6	CHECK FOR ERROR
	2	50.7	54.1	37.7- 70.8	41.9- 66.6	ACCEPTABLE

BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

USEPA Water Pollution Performance Evaluation

DATE: 6/22/93

WATER POLLUTION STUDY NUMBER WP030

LABORATORY: UT028

ANALYTES	SAMPLE NUMBER	REPORT VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	WARNING LIMITS	PERFORMANCE EVALUATION
VOLATILE AROMATICS IN MICROGRAMS PER LITER:						
ETHYLBENZENE	1	8.33	11.3	7.71- 14.7	8.60- 13.8	CHECK FOR ERROR
	2	45.9	52.4	36.2- 68.5	40.3- 64.4	ACCEPTABLE
TOLUENE	1	10.4	13.9	9.86- 17.7	10.9- 16.7	CHECK FOR ERROR
	2	28.7	33.9	24.0- 43.1	26.4- 40.7	ACCEPTABLE
1,2-DICHLOROBENZENE	1	8.34	12.1	8.47- 15.4	9.37- 14.5	NOT ACCEPTABLE
	2	42.6	52.0	36.1- 66.4	40.0- 62.5	ACCEPTABLE
1,3-DICHLOROBENZENE	1	6.30	9.43	6.17- 12.1	6.92- 11.4	CHECK FOR ERROR
	2	37.8	47.8	33.6- 61.2	37.2- 57.6	ACCEPTABLE
1,4-DICHLOROBENZENE	1	8.11	11.7	7.95- 15.2	8.86- 14.2	CHECK FOR ERROR
	2	48.1	58.1	39.1- 76.5	43.9- 71.7	ACCEPTABLE

MISCELLANEOUS PARAMETERS:

TOTAL CYANIDE (IN MG/L)	1	0.252	0.250	0.138-0.341	0.164-0.316	ACCEPTABLE
	2	0.131	0.130	.0821-0.169	.0932-0.158	ACCEPTABLE
NON-FILTERABLE RESIDUE (IN MG/L)	1	44.0	43.2	34.7- 45.2	36.0- 43.9	CHECK FOR ERROR
	2	33.7	33.0	24.0- 34.6	25.3- 33.2	CHECK FOR ERROR
OIL AND GREASE (IN MG/L)	1	16.6	15.0	8.13- 19.4	9.56- 18.0	ACCEPTABLE
	2	25.0	23.0	14.1- 28.1	15.9- 26.3	ACCEPTABLE
TOTAL PHENOLICS (IN MG/L)	1	0.028	.0271	.0093-.0449	.0139-.0403	ACCEPTABLE
	2	0.264	0.291	0.125-0.457	0.167-0.414	ACCEPTABLE
TOTAL RESIDUAL CHLORINE (IN MG/L)	1	0.685	0.729	0.469-0.912	0.528-0.853	ACCEPTABLE
	2	0.195	0.240	.0866-0.280	0.112-0.254	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY

13. Preventive Maintenance

In order to ensure timely production of data, Lancaster Laboratories, Inc. (LLI) and Mountain States Analytical, Inc. (MSAI) schedule routine preventive maintenance of instruments based on manufacturer's recommendations. Maintenance of the laboratory instruments is the responsibility of the technical group using the equipment in conjunction with our in-house equipment maintenance group. A schedule of routinely performed instrument maintenance tasks is attached as Table 13-1. All preventive maintenance, as well as maintenance performed as corrective action, is recorded in instrument logs.

Critical spare parts are kept in supply at the laboratory by the equipment maintenance group. Most items not kept in stock at the laboratory are available through overnight delivery from the manufacturer. In addition, LLI maintains multiple numbers of most of the critical instruments used in our laboratory operations. A recent equipment inventory may be found in the Qualification Manual. Because we are a large laboratory with redundant capacity, the problems of instrument downtime are minimized.

Table 13-1		
Preventive Maintenance Schedule		
Instrument	Preventive Maintenance	Frequency
GC/MS	Change septum Check fans Check cool flow Clean source Change oil in vacuum pump Change oil in turbo pump	Weekly or AN* Monthly Monthly Bimonthly or AN Semiannually Semiannually
GC	Septum change Column maintenance Clean detector Vacuum filters Leak check ECD's	Each run AN AN Semiannually Semiannually
Cold Vapor AA and Flame AA	Rinse burner head, chamber and trap Clean nebulizer Inspect tubing and O-rings Replace lamp	AN: Minimum Weekly Weekly Monthly AN
GFAA	Rinse workhead assembly Clean windows Replace probe tubing Check rinse bottle & drain	Weekly Weekly AN Daily
ICP	Clean torch Clean nebulizer & spray chamber Replace pump winding Lubricate autosampler Check mirror Checking tubing to torch Check fan filters, clean if needed Check cool flow, clean if needed Check water filter, replace if needed	Every other day Every other day After 4 runs After 4 runs After 4 runs After 4 runs Biweekly Biweekly Quarterly
Alpkem Autoanalyzer	Wipe platens/rollers with methanol Rinse reservoirs with deionized water Rinse distillation head Replace sampler/ transmission tubing Clean sampler probe Rinse flowcell with methanol Replace pump tubes	Weekly Monthly Monthly Biannual AN AN AN

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Table 13-1

Preventive Maintenance Schedule

Instrument	Preventive Maintenance	Frequency
Total Organic Carbon Analyzer	Check IR zero Check for leaks Check acid pump calib. Check persulfate pump calibration Inspect 6-port rotary valve Inspect sample pump head Wash molecular sieve Check sample loop calibration Clean gas permeation tube Inspect digestion vessel o-rings Check activated carbon scrubber Dust back and clean circuit boards Check IR cell	Weekly Weekly Bimonthly Bimonthly Monthly Monthly Quarterly Monthly Quarterly 6 Months 6 Months 6 Months Annually
Spectrometer	Check absorbance Check wavelength	Monthly Quarterly
pH Meter	Check level of buffer solution	Weekly

* AN means as needed. Any of these items may be performed more frequently if response during operation indicates this is necessary.

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14. Specific Routine Procedures Used to Assess Data Precision, Accuracy and Completeness

Precision - Precision refers to the reproducibility of a method when it is repeated on a second aliquot of the same sample. The degree of agreement is expressed as the Relative Percent Difference (RPD). The RPD will be calculated according to the following equation:

$$RPD = \frac{D_2 - D_1}{(D_1 + D_2) / 2} \times 100$$

Where: D_1 = First sample value
 D_2 = Second sample value (Duplicate)

Duplicates will be run on at least 5% of the samples. Acceptance criteria shall be based on statistical evaluation of past lab data. (See Section No. 11.) All Quality Control sample results are entered into the computer and compared with acceptance limits. In addition, there is a monthly review of values on the computer QC system. Data obtained from quality control samples is entered onto our computer system which charts the data, and calculates a mean and standard deviation on a monthly basis. The Quality Assurance Department then reviews this data for trends which may indicate analytical problems. The control charts are graphical methods for monitoring precision and bias over time.

Accuracy - Accuracy refers to the agreement between the amount of a compound measured by the test method and the amount actually present. Accuracy is usually expressed as a percent Recovery (R). Recoveries will be calculated according to the following equations:

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$$\text{Surrogate Recovery} = \frac{Q_d}{Q_a} \times 100$$

Where: Qd = quantity determined by analysis
Qa = quantity added to sample

$$\text{Matrix Spike Recovery} = \frac{SSR - SR}{SA} \times 100$$

Where: SSR = Spiked Sample Results
SR = Sample Results
SA = Spike added

$$\text{Laboratory Control Sample Recovery} = \frac{LCS \text{ Found}}{LCS \text{ True}} \times 100$$

Surrogate standards are added to each sample analyzed for organics. Spikes and Laboratory Control Samples will be run on at least 5% of the samples (each batch or SDG, ≤ 20 samples). Refer to Section 11 for acceptance criteria for accuracy. The computer is programmed to compare the individual values with the acceptance limits and inform the analyst if the results meet specification. If the results are not within the acceptance criteria, corrective action suitable to the situation will be taken. This may include, but is not limited to, checking calculations and instrument performance, reanalysis of the associated samples, examining other QC analyzed with the same batch of samples, and qualifying results with documentation of any QC problems in the Case Narrative.

Commercial quality control materials are run at least quarterly to ensure accuracy of the analytical procedure. Repetitive analysis of a reference material will also yield

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precision data. Accuracy information determined from reference materials is valuable because variables specific to sample matrix are eliminated.

The QC program is capable of charting data for surrogates, spikes, control materials and reference materials. The Quality Assurance Department reviews these charts for any indication of possible problems (ie shift in the mean and standard deviation).

Completeness - Completeness is the percentage of valid data acquired from a measurement system compared to the amount of valid measurements that were planned to be collected. The objective is analysis of all samples submitted intact, and to ensure that sufficient sample weight/volume is available should the initial analysis not meet acceptance criteria. The laboratory's Sample Management System will assign a unique identification number to the sample which tracks and controls movement of samples from the time of receipt until disposal. All data generated will be recorded referencing the corresponding sample identification number. The completeness of an analysis can be documented by including in the data deliverables sufficient information to allow the data user to assess the quality of the results. This information will include, but is not limited to, summaries of QC data and sample results, chromatograms, spectra, and instrument tune and calibration data. Additional information will be stored in the laboratory's archives, both hard copy and magnetic tape.

$$\text{Completeness} = \frac{\text{Number of valid measurements}}{\text{Total measurements needed}} \times 100$$

Method Detection Limit - It is important to ascertain the limit of quantitation that can be achieved by a given

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method, particularly when the method is commonly used to determine trace levels of analyte. The Environmental Protection Agency has set forth one method for determining method detection limits (MDLs) from which limits of quantitation (LOQs) can be extrapolated.

MDL is defined as follows for all measurements:

$$MDL = t_{(n-1, 1-\alpha=0.99)} \times S$$

Where: MDL = method detection limit
s = standard deviation of the replicate analyses
 $t_{(n-1, 1-\alpha=0.99)}$ = students' t-value for a one-sided
99% confidence level and a
standard deviation estimate with
with n-1 degrees of freedom

Definitions:

Method Detection Limit (MDL): The method detection limit is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. It is determined from analysis of a sample in a given matrix containing the analyte.

Limit of Quantitation (LOQ): The limit of quantitation is defined as the level above which quantitative results may be obtained with a specified degree of confidence. The EPA recommends setting quantitation limits at a value of five-to-ten times the MDL.

A list of MDLs and LOQs determined for each sample matrix type will be kept on file in the QA department. MDLs will be verified on an annual basis.

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15. Corrective Action

Whenever any of the data generated falls outside of the established acceptance criteria outlined for instrument tune and calibration (Section 8) and Internal QC (Section 11), the cause of this irregularity must be investigated, corrected, and documented. The documentation will be used to prevent a recurrence of the problem and to inform management of the situation.

If the results are not within acceptance criteria, the appropriate corrective action will be initiated. This may include, but is not limited to, checking calculation and instrument performance, reanalysis of the associated samples, examining other QC analyzed with the same batch of samples, and qualifying results with a comment stating the observed deviation.

A Standard Operating Procedure is in place which outlines the procedures to be followed when quality control data for an analysis falls outside of previously established acceptance limits. All QC data must be entered onto the computerized QC system promptly after its generation and daily "out-of-spec" data is reported via this system. Any data outside the acceptance criteria will be reviewed by the Quality Assurance Department. Where appropriate, the Quality Assurance Department will place outliers in one of three categories:

A. Marginal Outlier

Data that are outside the 95% confidence interval but within the 99% confidence interval. This category may also be used for QC samples subject to matrix interferences or sample inhomogeneity.

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B. Outlier

Data outside the 99% confidence interval and/or observable trends such as a shift in mean and standard deviation.

C. Extreme Outlier

Such data would indicate the system is out of control and no results should be reported to clients; an example would be more than one reference or control falling outside the 99% confidence interval.

The daily out-of-spec reports are then distributed to Group Leaders or their QC Coordinator who will check all supporting data and document their findings and any corrective action taken. Documentation of QC Data will be filed in the departmental QC notebook. In the case of Outliers or Extreme Outliers the Quality Assurance Department may issue a formal request for investigation and corrective action (see sample form that follows). The Quality Assurance Department is responsible for initiating the corrective actions, insuring that the actions are taken in a timely manner, and that the desired results are produced. The QA Department will circulate all completed Investigation & Corrective Action forms to the appropriate manager.

The Quality Assurance Department is also responsible for conducting periodic audits which ensure compliance with laboratory SOPs and assist in identifying and correcting any deficiencies. These audits may entail observation as procedures are carried out or a review of records to demonstrate traceability and compliance with all documented record keeping procedures. The QA Department will then issue a written report which summarizes the audit. The technical centers must respond in writing to the audit report within 30 days of report receipt. The response will

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address the corrective action that needs to be taken along with an expected completion date. Audit results and the corresponding response are communicated to laboratory personnel and management. Follow-up audits verify that proper corrective action has been taken for the identified discrepancy.



No. _____

INVESTIGATION AND CORRECTIVE ACTION REPORT

Part I Description of problem

1. Date
2. LLI sample number(s) involved
3. Nature of QA outlier

4. _____ Check if investigation must be complete before reporting further data to clients

Initiated by: _____

Part II (Attach separate sheet if needed)

1. Steps taken to investigate outlier:
2. Explanation of probable cause of outlier:
3. Steps taken to prevent future occurrence:
4. Besides the sample(s) listed above, would data sent to any clients be affected by this outlier? If yes, explain.

5. Signed: _____ Date: _____

Return by: _____

16. Quality Assurance Reports to Management

Reports of quality status from the Quality Assurance Department to management are made frequently and in various forms. All results from internal or external performance evaluation samples are circulated to management. A report of each audit performed is prepared and copied to management. Monthly summaries of data obtained from analysis of quality control check samples are generated via the computerized sample management system. These summaries include mean and standard deviation to aid in assessment of data accuracy and precision. Forms summarizing problems which require investigation and corrective action are completed by Group Leaders and circulated to management. Through these channels, laboratory management is kept apprised of QA/QC activities.

Any problems or unusual observations that occur during the analysis of samples for a specific project will be listed on the laboratory report and/or in the case narrative delivered with the data package. The items often discussed in this manner include samples with surrogate recovery outside of the acceptance criteria and samples with matrix problems requiring dilution and causing increased detection limits. Where applicable, any corrective action attempted or performed to address the problem will also be presented.

The laboratory will contact the client for direction regarding major problems such as samples listed on the chain of custody but missing from the shipping container, samples which arrive broken or are accidentally broken in the laboratory, and samples with severe matrix problems. The client will be contacted if it is necessary to change any item in the original project plan.

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Appendix A

Example Reporting Forms

NOTE: Example forms are representative of the information provided by both laboratories.

Data Package Content

- Title Page
- Sample Reference
- Table of Contents
- Chain of Custody
- Laboratory Chronicle
- Methodology/Reference Summary
- Laboratory Analysis Reports
- Per Parameter:
 - Case Narrative
 - Quality Control Summary
 - Tune
 - Surrogate Recovery
 - Method Blank
 - Matrix Spike/Matrix Spike Duplicate
 - Duplicate²
 - Standard Addition²
 - Serial Dilution²
 - Laboratory Control Sample Recovery (if applicable)
 - Interference Check²
 - Internal Standard¹
 - Sample Data
 - Sample Result Summary and LOQs
 - Sample Chromatograms
 - Quantitation Reports
 - Mass Spectra¹
 - Library Searches¹ (if applicable)
 - Confirmatory Chromatogram³
 - Confirmatory Quantitation Report³

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Standards Data Package

- Initial Calibration Summary Forms
- Initial Calibration Data
- Continuing Calibration Summary Forms
- Continuing Calibration Data
- Chromatograms and Quantitation Reports of Standards
- Calibration Data for Confirmation Columns³
- Calibration Curve (When quantitating against init. calib.)
- ICAP Interference Table²

Raw QC Data

- BFB/DFTPP Spectra and Mass Listing¹
- Method Blank Chromatograms, Quantitation Reports,
Mass Spectra¹ (GC/MS)
- Matrix Spike/Matrix Spike Duplicate Chromatograms and Quant.
Duplicate Data Printouts²
- Standard Addition Data²
- Serial Dilution Data²
- Laboratory Control Sample (if applicable)
- Copy of Instrument Run Log

Extraction/Digestion Logs

- Gel Permeation Chromatography (GPC), if applicable
- All Peaks Identified
- * Resolution Calculations

¹ GC/MS only

² Inorganics only

³ GC only (if applicable)

* Amount of documentation is dependent upon client request.

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Lancaster Laboratories

Where quality is a science.

Analysis Report

14:10:24 358848 REP

ASR000 D 2 1

00649 0

Smith Engineering, Inc.

1000 Any Street

Lancaster, PA 17601-5994

LLI Sample No. WW 1892665

Date Reported 11/12/92

Date Submitted 11/11/92

Discard Date 11/20/92

Collected 11/11/92 by MLH

Time Collected 1000

P.O.

Rel.

Water Sample from Monitoring Well #5

ANALYSIS	RESULT AS RECEIVED	LIMIT OF QUANTITATION	LAB CODE
Pesticides/PCB's	attached		017824000
Nitrite Nitrogen	1.0 mg/l	0.02	021900800
Nitrate Nitrogen	N.D. mg/l	0.05	022000700
Ammonia Nitrogen	6.5 mg/l	0.1	022202700
Ortho-Phosphate as P	N.D. mg/l	0.01	022601500
Lead	0.05 mg/l	0.1	025501400
Total Organic Carbon	1.2 mg/l	0.5	027302500

The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".

Total Coliform	N.D. /100ml	2.2	030101500
----------------	-------------	-----	-----------

This sample is SAFE for drinking or swimming according to bacteriological standards established by the U.S. Public Health Service and the Environmental Protection Agency (EPA).

Trichloroethene	5.4 ug/l	0.5	041800500
-----------------	----------	-----	-----------

1 COPY TO Kathy DiNunzio

1 COPY TO Smith Engineering, Inc.

ATTN: Mr. John Smith

Questions? Contact Environmental
Client Services at (717) 656-2301
611 00649 90.00 044600

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

David Evans, B.S.
Group Leader/Inst. Water Qlty

AR303184





Lancaster Laboratories
Where quality is a science.

14:10:28 358848 REP
ASR000 D 2 1
00649 0

Smith Engineering, Inc.
1000 Any Street
Lancaster, PA 17601-5994

LLI Sample No. WW 1892665
Date Reported 11/12/92
Date Submitted 11/11/92
Discard Date 11/20/92
Collected 11/11/92 by MLH
Time Collected 1000
P.O.
Rel.

Water Sample from Monitoring Well #5

	RESULT AS RECEIVED	LIMIT OF QUANTITATION	LAB CODE
Pesticides/PCB's			
Alpha BHC	0.008 J ug/l	0.01	190200000N
Beta BHC	0.007 J ug/l	0.01	190300000N
Gamma BHC - Lindane	0.05 ug/l	0.01	045300000N
Delta BHC	N.D. ug/l	0.01	190400000N
Heptachlor	N.D. ug/l	0.01	045400000N
Aldrin	N.D. ug/l	0.01	045500000N
Heptachlor Epoxide	N.D. ug/l	0.01	190500000N
DDE	2.00 ug/l	0.01	190600000N
DDD	N.D. ug/l	0.01	190700000N
DDT	N.D. ug/l	0.01	047800000N
Dieldrin	N.D. ug/l	0.01	046900000N
Endrin	N.D. ug/l	0.01	047700000N
Chlordane	N.D. ug/l	0.3	190800000N
Toxaphene	2.0 J ug/l	4.	190900000N
Endosulfan I	N.D. ug/l	0.01	191000000N
Endosulfan II	N.D. ug/l	0.01	191100000N
Endosulfan Sulfate	N.D. ug/l	0.03	191200000N
Endrin Aldehyde	N.D. ug/l	0.1	063800000N
PCB-1016	N.D. ug/l	1.	191300000N
PCB-1221	N.D. ug/l	1.	191400000N
PCB-1232	N.D. ug/l	1.	191500000N
PCB-1242	N.D. ug/l	1.	191600000N
PCB-1248	N.D. ug/l	1.	191700000N
PCB-1254	N.D. ug/l	1.	191800000N
PCB-1260	N.D. ug/l	1.	191900000N

1 COPY TO Kathy DiNunzio
1 COPY TO Smith Engineering, Inc.

ATTN: Mr. John Smith

Questions? Contact Environmental
Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Jenifer E. Hess, B.S.
Group Leader Pesticides/PCBs

AR303185





14:13:41 358845
ASR000 D 2 1
00649 0

Smith Engineering, Inc.
1000 Any Street
Lancaster, PA 17601-5994

LLI Sample No. WW 1892655
Date Reported 11/11/92
Date Submitted 11/11/92
Discard Date 11/19/92
Collected 11/11/92 by MLH
Time Collected 1000
P.O.
Rel.

Water Sample from Monitoring Well #5

ANALYSIS	RESULT AS RECEIVED	LIMIT OF QUANTITATION	LAB CODE
Pesticides/PCB's	attached		017824000
Nitrite Nitrogen	11. mg/l	0.02	021900800
Nitrate Nitrogen	< 0.05 mg/l	0.05	022000700
Ammonia Nitrogen	4.1 mg/l	0.1	022202700
Ortho-Phosphate as P	2.1 mg/l	0.01	022601500
Lead	0.3 mg/l	0.1	025501400
Total Organic Carbon	8.5 mg/l	0.5	027302500
The Total Organic Carbon (TOC) result reported above was determined by measuring total carbon by a persulfate digestion/infrared detection method on an acidified sample which has been purged of inorganic carbon using nitrogen. It represents "non-purgeable TOC".			
Total Coliform	< 2.2 /100ml	2.2	030101500
This sample is SAFE for drinking or swimming according to bacteriological standards established by the U.S. Public Health Service and the Environmental Protection Agency (EPA).			
Trichloroethene	12. ug/l	0.5	041800500

1 COPY TO Kathy DiNunzio

1 COPY TO Smith Engineering, Inc.

ATTN: Mr. John Smith

Questions? Contact Environmental
Client Services at (717) 656-2301
611 00649 90.00 044600

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

David Evans, B.S.
Group Leader/Inst. Water Qlty

AR303186





Lancaster Laboratories

Where quality is a science.

Analysis Report

14:13:43 358845

ASR000 D 2 1

00649 0

Smith Engineering, Inc.
1000 Any Street
Lancaster, PA 17601-5994

LLI Sample No. WW 1892655
Date Reported 11/11/92
Date Submitted 11/11/92
Discard Date 11/19/92
Collected 11/11/92 by MLH
Time Collected 1000
P.O.
Rel.

Water Sample from Monitoring Well #5

	RESULT AS RECEIVED	LIMIT OF QUANTITATION	LAB CODE
Pesticides/PCB's			
Alpha BHC	< 0.01 ug/l	0.01	190200000N
Beta BHC	< 0.01 ug/l	0.01	190300000N
Gamma BHC - Lindane	< 0.01 ug/l	0.01	045300000N
Delta BHC	< 0.01 ug/l	0.01	190400000N
Heptachlor	< 0.01 ug/l	0.01	045400000N
Aldrin	< 0.01 ug/l	0.01	045500000N
Heptachlor Epoxide	< 0.01 ug/l	0.01	190500000N
DDE	< 0.01 ug/l	0.01	190600000N
DDD	< 0.01 ug/l	0.01	190700000N
DDT	< 0.01 ug/l	0.01	047800000N
Dieldrin	< 0.01 ug/l	0.01	046900000N
Endrin	< 0.01 ug/l	0.01	047700000N
Chlordane	< 0.3 ug/l	0.3	190800000N
Toxaphene	< 4. ug/l	4.	190900000N
Endosulfan I	< 0.01 ug/l	0.01	191000000N
Endosulfan II	< 0.01 ug/l	0.01	191100000N
Endosulfan Sulfate	< 0.03 ug/l	0.03	191200000N
Endrin Aldehyde	< 0.1 ug/l	0.1	063800000N
PCB-1016	< 1. ug/l	1.	191300000N
PCB-1221	< 1. ug/l	1.	191400000N
PCB-1232	< 1. ug/l	1.	191500000N
PCB-1242	< 1. ug/l	1.	191600000N
PCB-1248	< 1. ug/l	1.	191700000N
PCB-1254	< 1. ug/l	1.	191800000N
PCB-1260	< 1. ug/l	1.	191900000N

1 COPY TO Kathy DiNunzio
1 COPY TO Smith Engineering, Inc.

ATTN: Mr. John Smith

Questions? Contact Environmental
Client Services at (717) 656-2301

Respectfully Submitted
Lancaster Laboratories, Inc.
Reviewed and Approved by:

Jenifer E. Hess, B.S.
Group Leader Pesticides/PCBs

AR303187



5A
VOLATILE ORGANIC GC/MS TUNING AND MASS
CALIBRATION - BROMOFLUOROBENZENE (BFB)

Name: LANCASTER LABS

Contract: _____

Lab Code: LANCAS Case No.: _____ SAS No.: _____ SDG No.: _____

Lab File ID: >ILDT4

BFB Injection Date: 07/13/92

Instrument ID: HP03046

BFB Injection Time: 17:12

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
50	15.0 - 40.0% of mass 95	17.0
75	30.0 - 60.0% of mass 95	44.1
95	Base peak, 100% relative abundance	100.
96	5.0 - 9.0% of mass 95	7.8
173	Less than 2.0% of mass 174	0.0 (0.0)1
174	Greater than 50.0% of mass 95	85.3
175	5.0 - 9.0% of mass 174	6.2 (7.2)1
176	Greater than 95.0%, but less than 101.0% of mass 174	83.1 (97.4)1
177	5.0 - 9.0% of mass 176	5.9 (7.1)2

1-Value is % mass 174

2-Value is % mass 176

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	VSTD050	VSTD050	>ILDS5	07/13/92	17:32
02	VBLKI57	VBLKI57	>ILDB7	07/13/92	18:54
03	UCCTB	1837872	>ILD10	07/13/92	19:42
04	13A--	1837871	>ILD11	07/13/92	20:22
05	4212-	1837870	>ILD12	07/13/92	21:14
06	14---	1837869	>ILD13	07/13/92	22:37
07	4213-	1837868	>ILD14	07/13/92	23:22
08	4209A	1837865	>ILD15	07/14/92	00:01
09	4209AMSD	1837867	>ILD17	07/14/92	01:22
10	4209AMS	1837866	>ILD18	07/14/92	02:00
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					

AR303188

2A

Lab Name: LANCASTER LABS

Contract:

Lab Code:

Case No:

SAS No:

SDG No:

	EPA SAMPLE NO.	S1 (DCE) #	S2 (TOL) #	S3 (BFB) #	OTHER	TOT OUT	COMMENTS
01	D11TB	95	98	100			TRAVEL BLANK
02	D1221	100	97	106			
03	D1221DL	99	98	107			2X DILUTION
04	D1368	107	99	102			
05	D1368DL	108	106	110			2X DILUTION
06	D1411	93	99	105			UNSPIKED
07	D1411MS	90	96	98			MATRIX SPIKE
08	D1441MSD	90	92	96			MATRIX SPIKE DUP
09	D15LF	94	92	100			
10	D1618	94	93	100			
11	D1618DL	91	89	98			2X DILUTION
12	D17FB	100	96	102			FIELD BLANK
13							
14	LAB QC						
15	VBLKG19	93	98	99			METHOD BLANK
16	VBLKG20	98	98	106			METHOD BLANK
17							
18							
19							
20							
21							
22							
23							
24							
25							

			QC LIMITS
S1	(DCE)	= 1,2-Dichloroethane-d4	76 - 114
S2	(TOL)	= Toluene-d8	88 - 110
S3	(BFB)	= Bromofluorobenzene	86 - 115

Column to be used to flag recovery values

* Values outside of contract required QC limits

D Surrogates diluted out

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

VLKI57

Lab Name: LANCASTER LABS

Contract: _____

Code: LANCAS Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) WATER

Lab Sample ID: VLKI57

Sample wt/vol: 5.0 (g/mL) ML

Lab File ID: >ILDB7

Level: (low/med) LOW

Date Received: _____

% Moisture: not dec. _____

Date Analyzed: 07/13/92

Column: (pack/cap) CAP

Dilution Factor: 1.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L Q

74-87-3-----	Chloromethane	10	U
75-01-4-----	Vinyl Chloride	10	U
74-83-9-----	Bromomethane	10	U
75-00-3-----	Chloroethane	10	U
75-69-4-----	Trichlorofluoromethane	5	U
107-02-8-----	Acrolein	100	U
75-35-4-----	1,1-Dichloroethene	5	U
75-09-2-----	Methylene Chloride	1	J
107-13-1-----	Acrylonitrile	100	U
75-34-3-----	1,1-Dichloroethane	5	U
540-59-0-----	1,2-Dichloroethene (total)	5	U
67-66-3-----	Chloroform	5	U
71-55-6-----	1,1,1-Trichloroethane	5	U
56-23-5-----	Carbon Tetrachloride	5	U
71-43-2-----	Benzene	5	U
107-06-2-----	1,2-Dichloroethane	5	U
79-01-6-----	Trichloroethene	5	U
78-87-5-----	1,2-Dichloropropane	5	U
75-27-4-----	Bromodichloromethane	5	U
110-75-8-----	2-Chloroethyl Vinyl Ether	10	U
10061-01-5-----	cis-1,3-Dichloropropene	5	U
108-88-3-----	Toluene	5	U
10061-02-6-----	trans-1,3-Dichloropropene	5	U
79-00-5-----	1,1,2-Trichloroethane	5	U
127-18-4-----	Tetrachloroethene	5	U
124-48-1-----	Dibromochloromethane	5	U
108-90-7-----	Chlorobenzene	5	U
100-41-4-----	Ethylbenzene	5	U
1330-20-7-----	Xylene (total)	5	U
75-25-2-----	Bromoform	5	U
79-34-5-----	1,1,2,2-Tetrachloroethane	5	U

FORM I VOA

1/87 Rev.

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4A
VOLATILE METHOD BLANK SUMMARY

Lab Name: LANCASTER LABS Contract: _____
 Lab Code: LANCAS Case No.: _____. SAS No.: _____. SDG No.: _____.
 Lab File ID: >INCB1 Lab Sample ID: VBLKI15
 Date Analyzed: 11/12/92 Time Analyzed: 08:43
 Matrix: (soil/water) SOIL Level:(low/med) LOW
 Instrument ID: HP03046

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	TIME ANALYZED
01	BKBO4	1892490	>INC01	09:45
02	BKBO4RE	1892490	>INC03	10:47
03	00011	1892493	>INC04	11:17
04	00012	1892494	>INC06	12:40
05	00010	1892492	>INC07	14:34
06	00008	1892566	>INC08	15:05
07	00009	1892567	>INC09	15:36
08	76001	1893113	>INC10	16:11
09	76004	1893115	>INC12	17:27
10	76003	1893114	>INC13	17:58
11	76005	1893116	>INC14	18:28
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				
24				
25				
26				
27				
28				
29				

COMMENTS: _____

Lancaster Laboratories, Inc.
GC/MS Volatiles Matrix Spike/Spike Duplicate Recoveries
=====

Unspiked: ^1LD15
4209A 1837865
Method: 1508
Instrument: HP03046

Matrix Spike: ^1LD18
4209AMS 1837866
Matrix/Level: WL
Dilution Factor: 1.0

Spike Duplicate: ^1LD17
4209AMSD 1837867
Batch: I921951AA

COMPOUND NAME	SPIKE LEVEL	US CONC UG/L	MS CONC UG/L	MSD CONC UG/L	MS REC %	MSD REC %	RPD %	RANGE LOWER-UPPER	IN SPEC
Chloromethane	20.00	0.00	19.05	17.55	95	88	8	1-273	YES
Vinyl Chloride	20.00	0.00	14.65	14.12	73	71	3	1-251	YES
Bromomethane	20.00	0.00	18.54	17.88	93	89	4	1-242	YES
Chloroethane	20.00	0.00	13.21	13.14	66	66	0	14-230	YES
Trichlorofluoromethane	20.00	0.00	20.42	19.63	102	95	7	17-181	YES
Acrolein	150.00	0.00	157.42	147.88	105	98	7	NOT GIVEN	
1,1-Dichloroethene	20.00	0.00	25.71	23.62	128	118	8	1-234	YES
Methylene Chloride	20.00	0.00	21.01	18.81	105	94	11	1-221	YES
Acrylonitrile	150.00	0.00	138.32	129.54	92	86	7	NOT GIVEN	
1,1-Dichloroethane	20.00	0.00	21.16	19.44	106	97	9	59-155	YES
1,2-Dichloroethene (total)	20.00	0.00	23.30	21.80	116	109	6	54-156	YES
Chloroform	20.00	0.00	20.70	18.25	104	91	13	51-138	YES
1,1,1-Trichloroethane	20.00	0.00	22.26	20.71	111	104	6	52-162	YES
Carbon Tetrachloride	20.00	0.00	22.18	20.26	111	101	9	70-140	YES
Benzene	20.00	1.03	21.13	19.88	100	94	6	37-151	YES
1,2-Dichloroethane	20.00	0.00	19.23	17.78	96	89	8	49-155	YES
Trichloroethene	20.00	1.07	21.95	20.34	104	96	8	71-157	YES
1,2-Dichloropropane	20.00	0.00	19.99	18.01	100	90	10	1-210	YES
Chloromethane	20.00	0.00	19.31	17.56	96	88	9	35-155	YES
Isobutyl Vinyl Ether	20.00	0.00	18.63	16.21	93	81	14	1-305	YES
cis-1,3-Dichloropropene	20.00	0.00	20.72	19.82	104	99	5	1-227	YES
Toluene	20.00	0.00	21.91	20.39	110	102	8	47-150	YES
trans-1,3-Dichloropropene	6.70	0.00	6.85	6.31	102	94	8	17-183	YES
1,1,2-Trichloroethane	20.00	0.00	20.46	18.63	102	93	9	52-150	YES
Tetrachloroethene	20.00	0.00	22.54	20.74	113	104	8	64-148	YES
Dibromochloromethane	20.00	0.00	19.26	17.29	96	86	11	53-149	YES
Chlorobenzene	20.00	0.00	22.05	19.77	110	99	10	37-160	YES
Ethylbenzene	20.00	0.00	22.63	20.95	113	105	7	37-162	YES
Xylene (total)	20.00	0.00	21.88	20.05	109	100	9	NOT GIVEN	
Bromoform	20.00	0.00	19.88	18.12	99	90	10	45-169	YES

N/C = Could not calculate

Lab Chronicle: _____ Ent. by _____
Ver. by _____

Analyst: _____ Date: _____

Auditor: _____ Date: _____

PAGE 1 OF 2

AR303192

Lancaster Laboratories, Inc.
GC/MS Volatiles Matrix Spike/Spike Duplicate Recoveries

Unspiked: ^1LD15
4209A 1837865
Method: 1508
Instrument: HP03046

Matrix spike: ^1LD18
4209AMS 1837866
Matrix/Level: WL
Dilution Factor: 1.0

Spike Duplicate: ^1LD17
4209AMSD 1837867
Batch: 1921951AA

COMPOUND NAME	SPIKE LEVEL	US CONC UG/L	MS CONC UG/L	MSD CONC UG/L	MS REC %	MSD REC %	RPD %	RANGE LOWER-UPPER	IN SPEC
1,1,2,2-Tetrachloroethane	20.00	0.00	19.49	18.32	97	92	5	46-157	YES

N/C = Could not calculate

Lab Chronicle: _____ Ent. by _____

_____ Ver. by _____

Analyst: _____ Date: _____

Auditor: _____ Date: _____

PAGE 2 OF 2

AR303193

Lancaster Laboratories, Inc.
GC/MS Volatiles Laboratory Control Sample Recovery

le: ^JLD20
Inst: KP03047
Dilution Factor: 1.0

Injected: 07/13/92 at 12:41
Sample: LCS LCS

Method: 1508
Matrix/level: WL
Batch: J921921AF

COMPOUND NAME	SPIKE LEVEL	LCS CONC UG/L	LCS REC %	RANGE LOWER-UPPER	IN SPEC
Chloromethane	20.00	14.28	71	1- 273	YES
Vinyl Chloride	20.00	14.91	74	1- 251	YES
Bromomethane	20.00	20.15	101	1- 242	YES
Chloroethane	20.00	14.63	73	14- 230	YES
Trichlorofluoromethane	20.00	19.08	95	17- 181	YES
Acrolein	150.00	176.98	118	NOT DETERMINED	
1,1-Dichloroethene	20.00	25.77	129	1- 234	YES
Methylene Chloride	20.00	24.52	123	1- 221	YES
Acrylonitrile	150.00	158.86	106	NOT DETERMINED	
1,1-Dichloroethane	20.00	21.63	108	59- 155	YES
1,2-Dichloroethene (total)	20.00	23.07	115	54- 156	YES
Chloroform	20.00	21.17	106	51- 138	YES
1,1,1-Trichloroethane	20.00	20.43	102	52- 162	YES
Carbon Tetrachloride	20.00	20.69	103	70- 140	YES
Benzene	20.00	21.16	106	37- 151	YES
1,2-Dichloroethane	20.00	21.91	110	49- 155	YES
Trichloroethene	20.00	20.76	104	71- 157	YES
1,2-Dichloropropane	20.00	20.91	104	1- 210	YES
Bromodichloromethane	20.00	20.06	100	35- 155	YES
2-Chloroethyl Vinyl Ether	20.00	18.38	92	1- 305	YES
trans-1,3-Dichloropropene	20.00	21.17	106	1- 227	YES
luene	20.00	21.37	107	47- 150	YES
trans-1,3-Dichloropropene	6.70	6.98	104	17- 183	YES
1,1,2-Trichloroethane	20.00	21.25	106	52- 150	YES
Tetrachloroethene	20.00	20.96	105	64- 148	YES
Dibromochloromethane	20.00	19.27	96	53- 149	YES
Chlorobenzene	20.00	21.06	105	37- 160	YES
Ethylbenzene	20.00	21.12	106	37- 162	YES
Xylene (total)	20.00	21.00	105	NOT DETERMINED	
Bromoform	20.00	21.14	106	45- 169	YES
1,1,2,2-Tetrachloroethane	20.00	21.58	108	46- 157	YES

Lab Chronicle: _____ Ent. by _____

Ver. by _____

Analyst: _____ Date: _____

Auditor: _____ Date: _____

AR303194

6A
VOLATILE ORGANICS INITIAL CALIBRATION DATA

Lab Name: LANCASTER LABS Contract: _____

Lab Code: LANCAS Case No.: _____ SAS No. _____ SDG No.: _____

Instrument ID: HP03046 Calibration Date(s): 06/22/92 06/22/92

Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP

Min RRF for SPCC(%) = 0.300 (0.250 for Bromoform) Max %RSD for CCC(*) = 30.0%

LAB FILE ID: RRF 20= >IUMI5 RRF 50= >IUMI4
RRF100= >IUMI3 RRF200= >IUMI2 RRF300= >IUMI1

COMPOUND	RRF 20	RRF 50	RRF100	RRF200	RRF300	RRF	% RSD
Chloromethane	# .764	.734	.639	.628	.763	.705	9.5#
Vinyl Chloride	* .971	.917	.789	.775	.956	.882	10.6*
Bromomethane	1.328	1.115	.967	.960	1.095	1.093	13.7
Chloroethane	.691	.657	.454	.413	.494	.542	23.0
Trichlorofluoromethane	2.021	1.860	1.748	1.706	1.915	1.850	6.9
Acrolein	.095	.094	.091	.088	.088	.091	3.5
1,1-Dichloroethene	* 1.014	1.048	.907	.874	1.058	.980	8.6*
Methylene Chloride	1.087	1.001	.954	.941	1.054	1.007	6.2
Acrylonitrile	.188	.178	.169	.160	.155	.170	8.0
trans-1,2-Dichloroethene	1.116	1.108	.995	.969	1.098	1.057	6.6
1,1-Dichloroethane	# 1.603	1.603	1.527	1.499	1.658	1.578	4.1#
cis-1,2-Dichloroethene	1.264	1.296	1.090	1.097	1.221	1.194	8.0
Chloroform	* 2.189	2.104	2.053	2.041	2.093	2.096	2.8*
1,1,1-Trichloroethane	1.769	1.675	1.509	1.463	1.622	1.608	7.7
Carbon Tetrachloride	1.640	1.664	1.554	1.514	1.651	1.605	4.2
Benzene	.673	.648	.563	.546	.593	.605	9.0
1,2-Dichloroethane	.301	.295	.300	.299	.276	.294	3.6
Trichloroethene	.418	.395	.345	.335	.362	.371	9.4
1,2-Dichloropropane	* .261	.254	.246	.241	.235	.247	4.2*
Bromodichloromethane	.507	.520	.526	.527	.498	.516	2.4
2-Chloroethyl Vinyl Ether	.182	.176	.160	.156	.153	.165	7.9
cis-1,3-Dichloropropene	.412	.413	.369	.368	.377	.388	5.9
Toluene	* 1.033	.986	.876	.886	.932	.943	7.1*
trans-1,3-Dichloropropene	.481	.477	.461	.478	.475	.475	1.6
1,1,2-Trichloroethane	.387	.369	.391	.386	.346	.376	5.0
Tetrachloroethene	.512	.486	.421	.410	.452	.456	9.4
Dibromochloromethane	.740	.731	.797	.790	.704	.753	5.3
Chlorobenzene	# .889	.831	.845	.843	.823	.846	3.0#
Ethylbenzene	* .375	.350	.307	.305	.324	.332	9.0*
m+p-Xylene	.501	.504	.409	.403	.436	.450	10.9
o-Xylene	.452	.438	.378	.363	.369	.400	10.5
Bromoform	# .608	.598	.662	.653	.554	.615	7.2#
1,1,2,2-Tetrachloroethane	# .625	.571	.548	.515	.460	.544	11.3#
1,2-Dichloroethane-d4	.305	.296	.294	.291	.279	.293	3.3
Toluene-d8	1.108	1.055	1.080	1.070	1.026	1.068	2.8
4-Bromofluorobenzene	.772	.701	.717	.689	.648	.705	6.4

AR303195

7A
VOLATILE CONTINUING CALIBRATION CHECK

Name: LANCASTER LABS Contract: _____
 Lab Code: LANCAS Case No.: _____ SAS No.: _____ SDG No.: _____
 Instrument ID: HP03046 Calibration Date: 07/13/92 Time: 1732
 Lab File ID: >ILDS5 Init. Calib. Date(s): 06/22/92 06/22/92
 Matrix:(soil/water) WATER Level:(low/med) LOW Column:(pack/cap) CAP
 Min RRF50 for SPCC(#) = 0.300 (0.250 for Bromoform) Max %D for CCC(*) = 25.0%

COMPOUND	RRF	RRF 50	%D
Chloromethane	# .705	.534	24.2#
Vinyl Chloride	* .882	.984	-11.6*
Bromomethane	1.093	1.082	1.0
Chloroethane	.542	.635	-17.2
Trichlorofluoromethane	1.850	1.846	.2
Acrolein	.091	.104	-14.2
1,1-Dichloroethene	* .980	.975	.5*
Methylene Chloride	1.007	1.192	-18.4
Acrylonitrile	.170	.212	-24.6
trans-1,2-Dichloroethene	1.057	1.107	-4.7
1,1-Dichloroethane	# 1.578	1.766	-11.9#
cis-1,2-Dichloroethene	1.194	1.281	-7.3
Chloroform	* 2.096	2.251	-7.4*
1,1,1-Trichloroethane	1.608	1.610	-.1
Carbon Tetrachloride	1.605	1.653	-3.0
Benzene	.605	.736	-21.6
1,2-Dichloroethane	.294	.345	-17.3
Trichloroethene	.371	.442	-19.0
1,2-Dichloropropane	* .247	.299	-21.0*
Bromodichloromethane	.516	.570	-10.5
2-Chloroethyl Vinyl Ether	.165	.212	-28.5
cis-1,3-Dichloropropene	.388	.463	-19.4
Toluene	* .943	1.033	-9.6*
trans-1,3-Dichloropropene	.475	.516	-8.7
1,1,2-Trichloroethane	.376	.405	-7.7
Tetrachloroethene	.456	.499	-9.3
Dibromochloromethane	.753	.810	-7.6
Chlorobenzene	# .846	.911	-7.7#
Ethylbenzene	* .332	.374	-12.8*
m+p-Xylene	.450	.492	-9.4
o-Xylene	.400	.459	-14.7
Bromoform	# .615	.637	-3.6#
1,1,2,2-Tetrachloroethane	# .544	.661	-21.4#
1,2-Dichloroethane-d4	.293	.324	-10.5
Toluene-d8	1.068	1.092	-2.2
4-Bromofluorobenzene	.705	.717	-1.7

AR303196

8A
VOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: LANCASTER LABS Contract: _____
 Lab Code: LANCAS Case No.: _____ SAS No.: _____ SDG No.: _____
 Lab File ID (Standard): >ILDS5 Date Analyzed: 07/13/92
 Instrument ID: HP03046 Time Analyzed: 17:32
 Matrix: (soil/water) WATER Level: (low/med) LOW Column: (pack/cap) CAP

	IS1 (BCM) AREA #	RT	IS2 (DFB) AREA #	RT	IS3 (CBZ) AREA #	RT
=====	=====	=====	=====	=====	=====	=====
12 HOUR STD	31678	9.37	115077	10.96	92066	15.24
=====	=====	=====	=====	=====	=====	=====
UPPER LIMIT	63356		230154		184132	
=====	=====	=====	=====	=====	=====	=====
LOWER LIMIT	15839		57539		46033	
=====	=====	=====	=====	=====	=====	=====
EPA SAMPLE NO.						
=====	=====	=====	=====	=====	=====	=====
01 VBLKI57	31466	9.37	115120	10.97	93081	15.24
02 UCCTB	32455	9.35	118433	10.95	95641	15.24
03 13A--	32736	9.36	119713	10.95	96727	15.23
04 4212-	35994	9.35	128962	10.94	106817	15.22
05 14---	34676	9.35	127422	10.95	100452	15.23
06 4213-	35683	9.34	129979	10.94	105747	15.23
07 4209A	36462	9.35	135997	10.94	105674	15.23
08 4209AMSD	36550	9.35	136406	10.95	107174	15.22
09 4209AMS	35523	9.34	133638	10.95	103039	15.23
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (BCM) = Bromochloromethane
 IS2 (DFB) = 1,4-Difluorobenzene
 IS3 (CBZ) = Chlorobenzene-d5

UPPER LIMIT = + 100%
 of internal standard area.
 LOWER LIMIT = - 50%
 of internal standard area.

Column used to flag internal standard area values with an asterisk

AR303197

5B
SEMIVOLATILE ORGANIC GC/MS TUNING AND MASS
CALIBRATION - DECAFLUOROTRIPHENYLPHOSPHINE (DFTPP)

Lab Name: LANCASTER LABS Contract: _____
 Lab Code: LANCAS Case No.: _____ SAS No.: _____ SDG No.: _____
 Lab File ID: >U1450 DFTPP Injection Date: 06/12/92
 Instrument ID: HP02861 DFTPP Injection Time: 07:12

m/e	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE
51	30.0 - 60.0% of mass 198	46.9
68	Less than 2.0% of mass 69	0.0 (0.0)1
69	Mass 69 relative abundance	60.7
70	Less than 2.0% of mass 69	.2 (.4)1
127	40.0 - 60.0% of mass 198	41.6
197	Less than 1.0% of mass 198	0.0
198	Base Peak, 100% relative abundance	100.
199	5.0 to 9.0% of mass 198	6.5
275	10.0 - 30.0% of mass 198	21.4
365	Greater than 1.00% of mass 198	2.69
441	Present, but less than mass 443	10.0
442	Greater than 40.0% of mass 198	64.7
443	17.0 - 23.0% of mass 442	12.8 (19.8)2

1-Value is % mass 69

2-Value is % mass 442

THIS TUNE APPLIES TO THE FOLLOWING SAMPLES, MS, MSD, BLANKS, AND STANDARDS:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED	TIME ANALYZED
01	SSTD160	APP1572	>U1451	06/12/92	07:38
02	SSTD50	APP1572	>U1452	06/12/92	08:27
03	SSTD120	APP1572	>U1453	06/12/92	09:56
04	SSTD20	APP1572	>U1454	06/12/92	10:45
05	SSTD80	APP1572	>U1455	06/12/92	11:34
06	CL-6SRE	1825576RE	>F1450	06/12/92	12:58
07	1CL7SR	1826076	>F1451	06/12/92	13:47
08	SBLKWB1626	162WAB	>F1452	06/12/92	14:35
09	162WBLCS	162WBLCS	>F1453	06/12/92	15:24
10	162WBUS	162WBUS	>F1454	06/12/92	16:13
11	162WBMS	162WBMS	>F1455	06/12/92	17:02
12	162WBMSD	162WBMSD	>F1456	06/12/92	17:51
13	EQUPT	1825580	>F1457	06/12/92	18:40
14					
15					
16					
17					
18					
19					
20					
21					
22					

2C
WATER SEMIVOLATILE SURROGATE RECOVERY

Lab Name: LANCASTER LABS Contract: _____
Lab Code: LANCAS Case No.: _____ SAS No.: _____ SDG No.: _____

	EPA SAMPLE NO.	S1 (NBZ) #	S2 (FBP) #	S3 (TPH) #	S4 (PHL) #	S5 (2FP) #	S6 (TBP) #	OTHER	TOT OUT
01	SBLKWE1706	68	65	72	30	44	71		0
02	17OWELCS	74	69	76	31	45	73		0
03	D4LF2	65	62	68	28	41	70		0
04	D4LF2MS	75	74	78	30	43	72		0
05	D4LF2MSD	74	72	76	31	44	76		0
06	D2LF1	62	61	70	28	42	72		0
07	31685	65	65	81	28	41	68		0
08	D5LF3	57	57	65	22	32	48		0
09	61985	65	63	78	28	42	64		0
10	D7PW1	68	66	78	31	45	75		0
11	81285	63	62	72	28	40	68		0
12	D9N51	66	68	82	27	39	69		0
13	D10FB	65	65	74	28	41	67		0
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									

QC LIMITS

S1 (NBZ) = Nitrobenzene-d5 (35-114)
 S2 (FBP) = 2-Fluorobiphenyl (43-116)
 S3 (TPH) = Terphenyl-d14 (33-141)
 S4 (PHL) = Phenol-d6 (10-94)
 S5 (2FP) = 2-Fluorophenol (21-100)
 S6 (TBP) = 2,4,6-Tribromophenol (10-123)

Column to be used to flag recovery values
 * Values outside of contract required QC limits
 D Surrogates diluted out

AR303199

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLKLA1709

Lab Name: LANCASTER LABS

Contract: _____

Code: LANCAS Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix: (soil/water) SOIL Lab Sample ID: SBLKLA170

Sample wt/vol: 30 (g/mL) G Lab File ID: >I6950

Level: (low/med) LOW Date Received: _____

% Moisture: not dec. _____ dec. _____ Date Extracted: 06/18/92

Extraction: (SepF/Cont/Sonc) SONC Date Analyzed: 06/22/92

GPC Cleanup: (Y/N) Y pH: _____ Dilution Factor: 1.0

CAS NO. COMPOUND CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG Q

62-75-9-----	N-Nitrosodimethylamine	330	U
109-06-8-----	2-Picoline	330	U
108-95-2-----	Phenol	330	U
62-53-3-----	Aniline	330	U
111-44-4-----	bis(2-Chloroethyl) ether	330	U
95-57-8-----	2-Chlorophenol	330	U
541-73-1-----	1,3-Dichlorobenzene	330	U
106-46-7-----	1,4-Dichlorobenzene	330	U
95-50-1-----	1,2-Dichlorobenzene	330	U
108-60-1-----	bis(2-Chloroisopropyl) ether	330	U
621-64-7-----	N-Nitroso-di-n-propylamine	330	U
67-72-1-----	Hexachloroethane	330	U
98-95-3-----	Nitrobenzene	330	U
78-59-1-----	Isophorone	330	U
88-75-5-----	2-Nitrophenol	330	U
105-67-9-----	2,4-Dimethylphenol	330	U
111-91-1-----	bis(2-Chloroethoxy) methane	330	U
120-83-2-----	2,4-Dichlorophenol	330	U
120-82-1-----	1,2,4-Trichlorobenzene	330	U
91-20-3-----	Naphthalene	330	U
87-68-3-----	Hexachlorobutadiene	330	U
59-50-7-----	4-Chloro-3-methylphenol	330	U
77-47-4-----	Hexachlorocyclopentadiene	330	U
88-06-2-----	2,4,6-Trichlorophenol	330	U
91-58-7-----	2-Chloronaphthalene	330	U
131-11-3-----	Dimethylphthalate	330	U
208-96-8-----	Acenaphthylene	330	U
606-20-2-----	2,6-Dinitrotoluene	330	U
99-09-2-----	3-Nitroaniline	330	U
83-32-9-----	Acenaphthene	330	U
51-28-5-----	2,4-Dinitrophenol	830	U

FORM I SV-1

1/87 Rev.

AR303200

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLKLA1709

Lab Name: LANCASTER LABS

Contract: _____

Lab Code: LANCAS

Case No.: _____

SAS No.: _____

SDG No.: _____

Matrix: (soil/water) SOIL

Lab Sample ID: SBLKLA170

Sample wt/vol: 30 (g/mL) G

Lab File ID: >I6950

Level: (low/med) LOW

Date Received:

% Moisture: not dec. _____ dec. _____

Date Extracted: 06/18/92

Extraction: (SepF/Cont/Sonc) SONC

Date Analyzed: 06/22/92

GPC Cleanup: (Y/N) Y

pH: _____

Dilution Factor: 1.0

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
---------	----------	---	---

100-02-7-----	4-Nitrophenol	830	U
121-14-2-----	2,4-Dinitrotoluene	330	U
84-66-2-----	Diethylphthalate	330	U
7005-72-3-----	4-Chlorophenyl-phenylether	330	U
86-73-7-----	Fluorene	330	U
100-01-6-----	4-Nitroaniline	330	U
534-52-1-----	4,6-Dinitro-2-methylphenol	830	U
86-30-6-----	N-Nitrosodiphenylamine (1)	330	U
122-66-7-----	1,2-Diphenylhydrazine	330	U
101-55-3-----	4-Bromophenyl-phenylether	330	U
118-74-1-----	Hexachlorobenzene	330	U
87-86-5-----	Pentachlorophenol	1700	U
85-01-8-----	Phenanthrene	330	U
120-12-7-----	Anthracene	330	U
84-74-2-----	Di-n-butylphthalate	330	U
206-44-0-----	Fluoranthene	330	U
92-87-5-----	Benzidine	3300	U
129-00-0-----	Pyrene	330	U
85-68-7-----	Butylbenzylphthalate	330	U
91-94-1-----	3,3'-Dichlorobenzidine	670	U
56-55-3-----	Benzo(a)anthracene	330	U
218-01-9-----	Chrysene	330	U
117-81-7-----	bis(2-Ethylhexyl)phthalate	330	U
117-84-0-----	Di-n-octylphthalate	330	U
205-99-2-----	Benzo(b)fluoranthene	330	U
207-08-9-----	Benzo(k)fluoranthene	330	U
50-32-8-----	Benzo(a)pyrene	330	U
193-39-5-----	Indeno(1,2,3-cd)pyrene	330	U
53-70-3-----	Dibenz(a,h)anthracene	330	U
191-24-2-----	Benzo(g,h,i)perylene	330	U

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

1/87 Rev.

AR303201

4B
SEMIVOLATILE METHOD BLANK SUMMARY

EPA SAMPLE NO.

Lab Name: LANCASTER LABS Contract: _____

Code: LANCAS Case No.: _____ SAS No.: _____ SDG No.: _____

Lab File ID: _____ Lab Sample ID: _____

Instrument ID: _____ Date Extracted: _____

Matrix: (soil/water) Date Analyzed: _____

Level: (low/med) Time Analyzed: _____

THIS METHOD BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

	EPA SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID	DATE ANALYZED
01	=====	=====	=====	=====
02	_____	_____	_____	_____
03	_____	_____	_____	_____
04	_____	_____	_____	_____
05	_____	_____	_____	_____
	_____	_____	_____	_____

COMMENTS: _____

SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE RECOVERY

Lab Name: LANCASTER LABS

Lab Code: LANCAS

Instrument: HP03301

SUBS METHOD 8270

SPIKE LEVEL: 100 UG/ML

AMT USED: 30.0

SAMPLE SPIKE LEVEL: 3745.UG/KG % MOISTURE 11. DILUTION: 1

US SAMPLE: 0101- 1836265 MS SAMPLE: 0101-MS 1836265 MSD SAMPLE: 0101-MSD 1836265

COMPOUND NAME	US CONC UG/KG	MS CONC UG/KG	MSD CONC UG/KG	MS REC %	MSD REC %	RPD %	RANGE LOWER-UPPER	IN SPEC
N-Nitrosodimethylamine	0.00	3166.89	3166.50	84	84	.01	29.3-100.5	YES
Phenol	0.00	3294.27	3340.31	88	89	-1.39	5.0-112.0	YES
bis(2-Chloroethyl)ether	0.00	3095.69	3175.74	83	85	-2.55	12.0-158.0	YES
2-Chlorophenol	0.00	3356.81	3452.60	90	92	-2.81	23.0-134.0	YES
1,3-Dichlorobenzene	0.00	3125.88	3255.69	83	87	-4.07	1.0-172.0	YES
1,4-Dichlorobenzene	0.00	3127.83	3215.93	84	86	-2.78	20.0-124.0	YES
1,2-Dichlorobenzene	0.00	2963.46	3103.79	79	83	-4.63	32.0-129.0	YES
bis(2-Chloroisopropyl)ether	0.00	3380.23	3476.61	90	93	-2.81	36.0-166.0	YES
N-Nitroso-di-n-propylamine	0.00	3457.82	3466.80	92	92	-.26	1.0-230.0	YES
Hexachloroethane	0.00	3069.69	3143.37	82	84	-2.37	40.0-113.0	YES
Nitrobenzene	0.00	3126.50	3249.55	83	87	-3.86	35.0-180.0	YES
Isophorone	0.00	3437.80	3431.53	92	92	.18	21.0-196.0	YES
2-Nitrophenol	0.00	3892.37	3759.65	104	100	3.47	29.0-182.0	YES
2,4-Dimethylphenol	0.00	3456.81	3447.74	92	92	.26	32.0-119.0	YES
bis(2-Chloroethoxy)methane	0.00	2607.48	2618.57	70	70	-.42	33.0-184.0	YES
2,4-Dichlorophenol	0.00	3343.56	3272.19	89	87	2.16	39.0-135.0	YES
1,2,4-Trichlorobenzene	0.00	3062.25	3144.28	82	84	-2.64	44.0-142.0	YES
Naphthalene	0.00	3311.86	3370.46	88	90	-1.75	21.0-133.0	YES
Hexachlorobutadiene	0.00	3281.52	3226.15	88	86	1.70	24.0-116.0	YES
4-Chloro-3-methylphenol	0.00	3384.94	3436.92	90	92	-1.52	22.0-147.0	YES
Hexachlorocyclopentadiene	0.00	1197.71	896.97	32	24	28.71	1.0-100.0	YES
2,4,6-Trichlorophenol	0.00	3688.74	3493.14	98	93	5.45	37.0-144.0	YES
2-Chloronaphthalene	0.00	3398.26	3331.89	91	89	1.97	60.0-118.0	YES
Dimethylphthalate	0.00	3521.36	3493.16	94	93	.80	1.0-112.0	YES
Acenaphthylene	0.00	3379.58	3349.67	90	89	.89	33.0-145.0	YES
2,6-Dinitrotoluene	0.00	3466.49	3454.84	92	92	.34	50.0-158.0	YES
Acenaphthene	0.00	3548.24	3569.36	95	95	-.59	47.0-145.0	YES
2,4-Dinitrophenol	0.00	2364.86	1513.32	63	40	43.91	1.0-191.0	YES
4-Nitrophenol	0.00	3517.55	3173.26	94	85	10.29	1.0-132.0	YES
2,4-Dinitrotoluene	0.00	3680.27	3608.50	98	96	1.97	39.0-139.0	YES
Diethylphthalate	0.00	3249.98	2931.05	87	78	10.32	1.0-114.0	YES
4-Chlorophenyl-phenylether	0.00	2768.33	2891.71	74	77	-4.36	25.0-158.0	YES
Fluorene	0.00	3277.18	3309.95	88	88	-.99	59.0-121.0	YES
4,6-Dinitro-2-methylphenol	0.00	2551.43	1828.74	68	49	33.00	1.0-181.0	YES
N-Nitrosodiphenylamine	0.00	3511.64	3234.57	94	86	8.21	37.8-147.0	YES
1,2-Diphenylhydrazine	0.00	3249.70	3322.12	87	89	-2.20	25.7-124.9	YES
4-Bromophenyl-phenylether	0.00	3493.55	3514.09	93	94	-.59	53.0-127.0	YES
Hexachlorobenzene	0.00	3326.39	3369.43	89	90	-1.29	1.0-152.0	YES
Pentachlorophenol	0.00	2743.89	2262.51	73	60	19.23	14.0-176.0	YES

AR303203

SOIL SEMIVOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLE RECOVERY

Lab Name: LANCASTER LABS

Lab Code: LANCAS

Instrument: HP03301

SUS46 METH00 8270

SPIKE LEVEL: 100 UG/ML

AMT USED: 30.0

SAMPLE SPIKE LEVEL: 3745.UG/KG % MOISTURE 11. DILUTION: 1

US SAMPLE: 0101-

1836265

MS SAMPLE: 0101-MS

1836265

MSD SAMPLE: 0101-MSD

1836265

COMPOUND NAME	US CONC UG/KG	MS CONC UG/KG	MSD CONC UG/KG	MS REC %	MSD REC %	RPD %	RANGE LOWER-UPPER	IN SPEC
Phenanthrene	0.00	3524.57	3770.24	94	101	-6.74	54.0-120.0	YES
Anthracene	0.00	3079.03	3079.03	82	82	- .00	27.0-133.0	YES
Di-n-butylphthalate	0.00	3218.05	3298.88	86	88	-2.48	1.0-118.0	YES
Fluoranthene	0.00	3280.20	3369.92	88	90	-2.70	26.0-137.0	YES
Benzidine	0.00	8981.62	12650.0	48	68	-33.92	1.0-101.8	YES
Pyrene	0.00	3924.64	4074.19	105	109	-3.74	52.0-115.0	YES
Butylbenzylphthalate	0.00	3370.03	3416.35	90	91	-1.37	1.0-152.0	YES
3,3'-Dichlorobenzidine	0.00	2083.09	2435.33	56	65	-15.59	1.0-262.0	YES
Benzo(a)anthracene	0.00	3660.35	3836.40	98	102	-4.70	33.0-143.0	YES
Chrysene	0.00	3649.47	3633.50	97	97	.44	17.0-168.0	YES
bis(2-Ethylhexyl)phthalate	117.90	3355.54	3598.74	86	93	-7.24	8.0-158.0	YES
Di-n-octylphthalate	0.00	3305.75	3494.29	88	93	-5.55	4.0-146.0	YES
Benzo(b)fluoranthene	0.00	3162.80	3365.10	84	90	-6.20	24.0-159.0	YES
Benzo(k)fluoranthene	0.00	3652.84	3671.10	98	98	-.50	11.0-163.0	YES
Benzo(a)pyrene	0.00	3723.19	3871.58	99	103	-3.91	17.0-163.0	YES
Indeno(1,2,3-cd)pyrene	0.00	4215.66	4304.08	112	115	-2.08	1.0-171.0	YES
Dibenz(a,h)anthracene	0.00	4015.16	4120.64	107	110	-2.59	1.0-227.0	YES
Benzo(g,h,i)perylene	0.00	3750.23	4019.39	100	107	-6.93	1.0-219.0	YES

COMMENTS:

AR303204

SOIL SEMIVOLATILE QUALITY CONTROL REFERENCE SAMPLE RECOVERY

NAME: LANCASTER LABS

LAB CODE: LANCAS

INSTRUMENT: HP03301

SAMPLE METHOD: 8270 SPIKE LEVEL: 100 UG/L

LCS SAMPLE NO: 184LALCS 184LALCS

COMPOUND NAME	OCREF CONC	OCREF REC	RANGE	IN SPEC
	UG/L	%	LOWER-UPPER	
N-Nitrosodimethylamine	81.74	82	29.3- 100.5	YES
Phenol	85.47	85	5.0- 112.0	YES
bis(2-Chloroethyl)ether	81.11	81	12.0- 158.0	YES
2-Chlorophenol	87.16	87	23.0- 134.0	YES
1,3-Dichlorobenzene	81.82	82	1.0- 172.0	YES
1,4-Dichlorobenzene	80.99	81	20.0- 124.0	YES
1,2-Dichlorobenzene	79.40	79	32.0- 129.0	YES
bis(2-Chloroisopropyl)ether	88.50	88	36.0- 166.0	YES
N-Nitroso-di-n-propylamine	88.15	88	1.0- 230.0	YES
Hexachloroethane	81.81	82	40.0- 113.0	YES
Nitrobenzene	84.48	84	35.0- 180.0	YES
Isophorone	90.20	90	21.0- 196.0	YES
2-Nitrophenol	100.43	100	29.0- 182.0	YES
2,4-Dimethylphenol	83.05	83	32.0- 119.0	YES
bis(2-Chloroethoxy)methane	68.32	68	33.0- 184.0	YES
2,4-Dichlorophenol	83.75	84	39.0- 135.0	YES
1,2,4-Trichlorobenzene	81.01	81	44.0- 142.0	YES
Naphthalene	85.70	86	21.0- 133.0	YES
Hexachlorobutadiene	85.97	86	24.0- 116.0	YES
2,4,6-Trichlorophenol	86.04	86	22.0- 147.0	YES
1,2,3,4-Tetrachlorocyclopentadiene	88.71	89	1.0- 100.0	YES
2,4,6-Trichlorophenol	89.39	89	37.0- 144.0	YES
2-Chloronaphthalene	84.52	84	60.0- 118.0	YES
Dimethylphthalate	87.31	87	1.0- 112.0	YES
Acenaphthylene	84.89	85	33.0- 145.0	YES
2,6-Dinitrotoluene	87.03	87	50.0- 158.0	YES
Acenaphthene	90.36	90	47.0- 145.0	YES
2,4-Dinitrophenol	94.31	94	1.0- 191.0	YES
4-Nitrophenol	86.96	87	1.0- 132.0	YES
2,4-Dinitrotoluene	91.51	92	39.0- 139.0	YES
Diethylphthalate	80.65	81	1.0- 114.0	YES
4-Chlorophenyl-phenylether	70.89	71	25.0- 158.0	YES
Fluorene	81.22	81	59.0- 121.0	YES
4,6-Dinitro-2-methylphenol	99.75	100	1.0- 181.0	YES
N-Nitrosodiphenylamine	88.05	88	37.8- 147.0	YES
1,2-Diphenylhydrazine	86.08	86	25.7- 124.9	YES
4-Bromophenyl-phenylether	89.22	89	53.0- 127.0	YES
Hexachlorobenzene	85.99	86	1.0- 152.0	YES
Pentachlorophenol	80.55	80	14.0- 176.0	YES

AR303205

SOIL SEMIVOLATILE QUALITY CONTROL REFERENCE SAMPLE RECOVERY

LAB NAME: LANCASTER LABS

LAB CODE: LANCAS

INSTRUMENT: HP03301

SUBS:6 METHOD 8270

SPIKE LEVEL: 100 UG/L

LCS SAMPLE NO: 184LALCS

184LALCS

COMPOUND NAME	QCREF CONC UG/L	QCREF REC %	RANGE		IN SPEC
			LOWER	UPPER	
Phenanthrene	88.20	88	54.0	120.0	YES
Anthracene	81.71	82	27.0	133.0	YES
Di-n-butylphthalate	86.08	86	1.0	118.0	YES
Fluoranthene	86.63	87	26.0	137.0	YES
Benzidine	258.59	52	1.0	101.8	YES
Pyrene	96.38	96	52.0	115.0	YES
Butylbenzylphthalate	85.74	86	1.0	152.0	YES
3,3'-Dichlorobenzidine	42.09	42	1.0	262.0	YES
Benzo(a)anthracene	88.85	89	33.0	143.0	YES
Chrysene	90.05	90	17.0	168.0	YES
bis(2-Ethylhexyl)phthalate	87.65	88	8.0	158.0	YES
Di-n-octylphthalate	83.64	84	4.0	146.0	YES
Benzo(b)fluoranthene	72.13	72	24.0	159.0	YES
Benzo(k)fluoranthene	97.12	97	11.0	163.0	YES
Benzo(a)pyrene	92.44	92	17.0	163.0	YES
Indeno(1,2,3-cd)pyrene	115.16	115	1.0	171.0	YES
Dibenz(a,h)anthracene	104.34	104	1.0	227.0	YES
Benzo(g,h,i)perylene	104.26	104	1.0	219.0	YES

COMMENTS:

AR303206

8B

SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Name: LANCASTER LABS

Contract: _____

Code: LANCAS

Case No.: _____

SAS No.: _____

SDG No.: _____

Lab File ID (Standard): >U1702

Date Analyzed: 06/19/92

Instrument ID: HP02861

Time Analyzed: 07:03

	IS1 (DCB) AREA #	RT	IS2 (NPT) AREA #	RT	IS3 (ANT) AREA #	RT
=====	=====	=====	=====	=====	=====	=====
12 HOUR STD	23030	8.57	98150	12.27	57525	17.70
=====	=====	=====	=====	=====	=====	=====
UPPER LIMIT	46060		196300		115050	
=====	=====	=====	=====	=====	=====	=====
LOWER LIMIT	11515		49075		28763	
=====	=====	=====	=====	=====	=====	=====
EPA SAMPLE NO.						
=====	=====	=====	=====	=====	=====	=====
01 45586	24672	8.56	99296	12.25	59784	17.69
02 45588	24154	8.56	96319	12.26	57794	17.69
03 45589	25470	8.56	102266	12.26	60535	17.68
04 45590	24262	8.55	96444	12.25	57609	17.69
05 45591	23391	8.56	93705	12.25	56056	17.69
06 45592	24525	8.56	96816	12.25	57205	17.68
07 SBLKWE1706	23606	8.56	94750	12.25	57234	17.69
08 170WELCS	24132	8.56	96206	12.28	57908	17.70
09 D4LF2	24509	8.56	97080	12.26	58661	17.70
10 D4LF2MS	25182	8.57	102457	12.28	59352	17.70
11 D4LF2MSD	24377	8.57	98374	12.28	57651	17.72
12 D2LF1	23925	8.57	94391	12.26	57152	17.69
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (DCB) = 1,4-Dichlorobenzene-d4

IS2 (NPT) = Naphthalene-d8

IS3 (ANT) = Acenaphthene-d10

UPPER LIMIT = + 100%

of internal standard area.

LOWER LIMIT = - 50%

of internal standard area.

Column used to flag internal standard area values with an asterisk

AR303207

8C
SEMIVOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: LANCASTER LABS Contract: _____
 Lab Code: LANCAS Case No.: _____ SAS No.: _____ SDG No.: _____
 Lab File ID (Standard): >U1702 Date Analyzed: 06/19/92
 Instrument ID: HP02861 Time Analyzed: 07:03

	IS4(PHN) AREA #	RT	IS5(CRY) AREA #	RT	IS6(PRY) AREA #	RT
=====	=====	=====	=====	=====	=====	=====
12 HOUR STD	94913	22.26	45470	30.54	22917	34.71
=====	=====	=====	=====	=====	=====	=====
UPPER LIMIT	189826		90940		45834	
=====	=====	=====	=====	=====	=====	=====
LOWER LIMIT	47457		22735		11459	
=====	=====	=====	=====	=====	=====	=====
EPA SAMPLE NO.						
=====	=====	=====	=====	=====	=====	=====
01 45586	93228	22.24	35881	30.55	21301	34.72
02 45588	85844	22.24	39309	30.54	28105	34.71
03 45589	93886	22.24	38502	30.54	22340	34.72
04 45590	90580	22.23	34712	30.53	21036	34.71
05 45591	88441	22.24	33784	30.53	20133	34.71
06 45592	87212	22.23	34405	30.54	19093	34.71
07 SBLKWE1706	90741	22.24	39826	30.55	25317	34.71
08 170WELCS	94491	22.26	45373	30.55	27570	34.71
09 D4LF2	94980	22.24	39878	30.55	23810	34.71
10 D4LF2MS	93986	22.27	42812	30.56	24431	34.72
11 D4LF2MSD	94170	22.27	46417	30.57	26865	34.73
12 D2LF1	93204	22.24	40849	30.55	26079	34.72
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS4 (PHN) = Phenanthrene-d10
 IS5 (CRY) = Chrysene-d12
 IS6 (PRY) = Perylene-d12

UPPER LIMIT = + 100%
 of internal standard area.
 LOWER LIMIT = - 50%
 of internal standard area.

Column used to flag internal standard area values with an asterisk

Initial Calibration Data
HSL Compounds

Case No: Instrument ID: HP03301

Contractor: LANCASTER LABS

Calibration Date: 07/04/92

Fract No:

Minimum RF for SPCC is 0.05

Maximum % RSD for CCC is 30.0%

Laboratory ID: >W7203 >W7205 >W7204 >W7202 >W7201

Compound	RF 20.00	RF 50.00	RF 80.00	RF 120.00	RF 160.00	RRT	RF	% RSD	CCC	SPCC
N-Nitrosodimethylamine	.79215	.82554	.85326	.86241	.80014	.413	.82670	3.768		
2-Picoline	1.35951	1.42977	1.51909	1.49935	1.41079	.571	1.44370	4.535		
Phenol	1.82504	1.71783	1.67268	1.64775	1.57239	.913	1.68714	5.535	*	
Aniline	2.23733	2.20556	2.23331	2.20993	2.08297	.921	2.19382	2.895		
bis(2-Chloroethyl)ether	1.56329	1.43752	1.43071	1.43945	1.37231	.937	1.44865	4.820		
2-Chlorophenol	1.46264	1.38858	1.37290	1.36104	1.29364	.948	1.37576	4.404		
1,3-Dichlorobenzene	1.63905	1.45558	1.36515	1.36480	1.30204	.986	1.42532	9.220		
1,4-Dichlorobenzene	1.67988	1.46693	1.35451	1.36371	1.26978	1.004	1.42696	11.054	*	
1,2-Dichlorobenzene	1.68317	1.52105	1.43128	1.39256	1.34090	1.041	1.47379	9.112		
bis(2-Chloroisopropyl)ether	4.50053	4.68677	4.67513	4.58089	4.44439	1.068	4.57754	2.320		
N-Nitroso-di-n-propylamine	1.48989	1.51378	1.49465	1.47022	1.45112	1.104	1.48393	1.618		**
Hexachloroethane	.89850	.84677	.80621	.80198	.78519	1.126	.82773	5.506		
2-Fluorophenol	1.24298	1.24730	1.21432	1.19973	1.11904	.697	1.20467	4.300		
Phenol-d6	1.85609	1.81422	1.79029	1.79168	1.66119	.909	1.78269	4.092		
Nitrobenzene	.21186	.19914	.19299	.18814	.17833	.864	.19409	6.447		
Isophorone	.99067	.94687	.95230	.93721	.91919	.911	.94925	2.777		
2-Nitrophenol	.22090	.23546	.23247	.22523	.21163	.925	.22514	4.218	*	
2,4-Dimethylphenol	.41340	.40459	.39781	.39794	.37792	.932	.39833	3.282		
2-Chloroethoxy)methane	.65025	.59659	.57808	.55937	.54178	.953	.58521	7.131		
Dichlorophenol	.34382	.33154	.31809	.30781	.29925	.972	.32010	5.596	*	
1,2,4-Trichlorobenzene	.38930	.35400	.32515	.31724	.29668	.989	.33648	10.694		
Naphthalene	1.12051	.96904	.87731	.87843	.81424	1.005	.93190	12.769		
Hexachlorobutadiene	.20654	.19705	.19069	.17496	.16543	1.028	.18693	8.898	*	
4-Chloro-3-methylphenol	.30730	.29278	.28243	.27501	.27113	1.110	.28573	5.114	*	
Nitrobenzene-d5	.51351	.51910	.51234	.49674	.47143	.860	.50262	3.842		
Hexachlorocyclopentadiene	.20422	.32896	.32458	.30685	.30622	.866	.29417	17.443	**	
2,4,6-Trichlorophenol	.42036	.43846	.41784	.39389	.39789	.885	.41369	4.386	*	
2-Chloronaphthalene	1.26268	1.17370	1.05965	1.02438	.94311	.917	1.09270	11.539		
Dimethylphthalate	1.60010	1.56057	1.49083	1.42663	1.27337	.960	1.47030	8.744		
Acenaphthylene	2.12120	1.94575	1.78450	1.73436	1.59293	.979	1.83575	11.079		

Py
7-4-92

RF - Response Factor (Subscript is amount in MG/L)

RRT - Average Relative Retention Time (RT Std/RT Istd)

RF - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Initial Calibration Data
HSL Compounds

Case No: Instrument ID: HP03301
Contractor: LANCASTER LABS Calibration Date: 07/04/92
Contract No:

Minimum RF for SPCC is 0.05 Maximum % RSD for CCC is 30.0%

Compound	Laboratory ID: >W7203 >W7205 >W7204 >W7202 >W7201					RRT	RF	% RSD	CCC	SPCC
	RF	RF	RF	RF	RF					
	20.00	50.00	80.00	120.00	160.00					
3-Nitroaniline	.37385	.48117	.46716	.44045	.42082	.995	.43669	9.662		
Acenaphthene	1.32222	1.17549	1.06646	1.02033	.93873	1.006	1.10464	13.462	*	
2,4-Dinitrophenol	.15894	.22404	.23737	.22661	.21763	1.010	.21292	14.562	**	(Conc=40.0,50.0,80.0,120.
4-Nitrophenol	.13029	.19084	.19667	.17725	.15701	1.018	.17041	15.918	**	(Conc=40.0,50.0,80.0,120.
2,6-Dinitrotoluene	.38226	.40717	.39060	.37954	.36003	.969	.38392	4.470		
2,4-Dinitrotoluene	.54041	.56621	.48378	.48007	.41782	1.030	.49766	11.631		
Diethylphthalate	1.97196	1.84260	1.62296	1.59064	1.42316	1.067	1.69026	12.838		
4-Chlorophenyl-phenylether	.62442	.48771	.40201	.39547	.35449	1.083	.45286	23.727		
Fluorene	1.32669	1.02768	.89695	.85934	.78605	1.084	.97934	21.753		
4-Nitroaniline	.32227	.45515	.44278	.40281	.35447	1.087	.39550	14.355		
2-Fluorobiphenyl	1.33740	1.20670	1.06727	1.03407	.96266	.898	1.12162	13.350		
2,4,6-Tribromophenol	.27263	.31503	.30449	.28091	.25466	1.119	.28555	8.526		
4,6-Dinitro-2-methylphenol	.15465	.16844	.16739	.16289	.16180	.891	.16304	3.359		(Conc=40.0,50.0,80.0,120.
N-Nitrosodiphenylamine	.54129	.50230	.47344	.44622	.44457	.899	.48156	8.486	*	
1,2-Diphenylhydrazine	1.39834	1.33712	1.24190	1.17339	1.16263	.904	1.26267	8.150		
4-Bromophenyl-phenylether	.21620	.19999	.18356	.16861	.17047	.944	.18777	10.789		
Hexachlorobenzene	.32181	.29905	.26912	.25965	.26090	.952	.28210	9.685		
Pentachlorophenol	.14111	.17763	.17259	.16216	.16479	.975	.16372	8.597	*	(Conc=40.0,50.0,80.0,120.
Phenanthrene	1.17905	1.02682	.91801	.88451	.88627	1.003	.97893	12.876		
Anthracene	1.18798	1.06212	.93990	.90084	.87522	1.010	.99321	13.126		
Di-n-butylphthalate	2.09753	1.84120	1.61059	1.57147	1.48288	1.071	1.72073	14.455		
Fluoranthene	1.25600	1.13706	1.02384	.96825	.93051	1.151	1.06313	12.514	*	
Terphenyl-d14	1.25584	1.08434	.99585	.92541	.93559	.901	1.03941	13.133		
Senzidine	.55445	.65906	.62454	.51271	.53230	.879	.57661	10.842		(Conc=100.0,200.0,300.0,4
Pyrene	2.01688	1.73171	1.66909	1.56641	1.55634	.888	1.70809	10.973		
Butylbenzylphthalate	1.39885	1.22386	1.18583	1.11673	1.11323	.946	1.20770	9.663		
3,3'-Dichlorobenzidine	.37029	.49554	.48936	.40532	.43119	.995	.43834	12.311		
Benzo(a)anthracene	1.12577	1.08713	1.05545	.97467	.95318	.999	1.03924	7.074		
bis(2-Ethylhexyl)phthalate	1.99554	1.55638	1.37333	1.31946	1.23819	.998	1.49658	20.208		
Chrysene	1.20220	1.14718	1.10979	1.02970	1.03118	1.003	1.10401	6.773		

RF - Response Factor (Subscript is amount in MG/L)

RRT - Average Relative Retention Time (RT Std/RT 1std)

RF - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Initial Calibration Data
HSL Compounds

Case No: Instrument ID: HP03301

Contractor: LANCASTER LABS Calibration Date: 07/04/92

Contract No:

Minimum RF for SPCC is 0.05 Maximum % RSD for CCC is 30.0%

Laboratory ID: >W7203 >W7205 >W7204 >W7202 >W7201

Compound	RF 20.00	RF 50.00	RF 80.00	RF 120.00	RF 160.00	RRT	RF	% RSD	CCC	SPCC
Di-n-octylphthalate	4.34758	3.67292	3.38699	3.54509	3.40243	.901	3.67100	10.780	*	
Benzo(b)fluoranthene	1.22924	1.25774	1.25927	1.35750	1.25857	.949	1.27246	3.867		
Benzo(k)fluoranthene	1.28394	1.21770	1.16070	1.21695	1.14036	.953	1.20393	4.675		
Benzo(a)pyrene	1.05205	1.10999	1.11644	1.16409	1.09115	.993	1.10674	3.678	*	
Indeno(1,2,3-cd)pyrene	.76536	.75464	.77939	.81705	.78521	1.190	.78033	3.044		
Dibenz(a,h)anthracene	.69699	.74496	.75972	.78316	.74132	1.196	.74523	4.238		
Benzo(g,h,i)perylene	.78372	.82966	.81472	.85164	.83911	1.251	.82383	3.183		

RF - Response Factor (Subscript is amount in MG/L)

RRT - Average Relative Retention Time (RT Std/RT Istd)

RF - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

AR303211

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 07/04/92
Contractor: LANCASTER LABS Time: 13:32
Fact No: Laboratory ID: >W7205
Instrument ID: HP03301 Initial Calibration Date: 07/04/92

Minimum RF for SPCC is 0.05 Maximum % Diff for CCC is 30.0%

Compound	RF	RF	%Diff	CCC	SPCC
N-Nitrosodimethylamine	.82670	.82554	.14		
2-Picoline	1.44370	1.42977	.97		
Phenol	1.68714	1.71783	1.82	*	
Aniline	2.19382	2.20556	.53		
bis(2-Chloroethyl)ether	1.44865	1.43752	.77		
2-Chlorophenol	1.37576	1.38858	.93		
1,3-Dichlorobenzene	1.42532	1.45558	2.12		
1,4-Dichlorobenzene	1.42696	1.46693	2.80	*	
1,2-Dichlorobenzene	1.47379	1.52105	3.21		
bis(2-Chloroisopropyl)ether	4.57754	4.68677	2.39		
N-Nitroso-di-n-propylamine	1.48393	1.51378	2.01	**	
Hexachloroethane	.82773	.84677	2.30		
2-Fluorophenol	1.20467	1.24730	3.54		
Phenol-d6	1.78269	1.81422	1.77		
Nitrobenzene	.19409	.19914	2.60		
Isophorone	.94925	.94687	.25		
2-Nitrophenol	.22514	.23546	4.59	*	
2,4-Dimethylphenol	.39833	.40459	1.57		
2-Chloroethoxy)methane	.58521	.59659	1.94		
Dichlorophenol	.32010	.33154	3.57	*	
1,2,4-Trichlorobenzene	.33648	.35400	5.21		
Naphthalene	.93190	.96904	3.98		
Hexachlorobutadiene	.18693	.19705	5.41	*	
4-Chloro-3-methylphenol	.28573	.29278	2.47	*	
Nitrobenzene-d5	.50262	.51910	3.28		
Hexachlorocyclopentadiene	.29417	.32896	11.83	**	
2,4,6-Trichlorophenol	.41369	.43846	5.99	*	
2-Chloronaphthalene	1.09270	1.17370	7.41		
Dimethylphthalate	1.47030	1.56057	6.14		
Acenaphthylene	1.83575	1.94575	5.99		
3-Nitroaniline	.743669	.48117	10.19		
Acenaphthene	1.10464	1.17549	6.41	*	

RF - Response Factor from daily standard file at 50.00 MG/L

RF - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

AR303212

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 07/04/92

Contractor: LANCASTER LABS Time: 13:32

Contract No: Laboratory ID: >W7205

Instrument ID: HP03301 Initial Calibration Date: 07/04/92

Minimum RF for SPCC is 0.05 Maximum % Diff for CCC is 30.0%

Compound	RF	RF	%Diff	CCC	SPCC
2,4-Dinitrophenol	.21292	.22404	5.22	**	(Conc=50.00)
4-Nitrophenol	.17041	.19084	11.99	**	(Conc=50.00)
2,6-Dinitrotoluene	.38392	.40717	6.06		
2,4-Dinitrotoluene	.49766	.56621	13.77		(Conc=50.00)
Diethylphthalate	1.69026	1.84260	9.01		
4-Chlorophenyl-phenylether	.45286	.48771	7.70		
Fluorene	.97934	1.02768	4.94		
4-Nitroaniline	.39550	.45515	15.08		
2-Fluorobiphenyl	1.12162	1.20670	7.59		
2,4,6-Tribromophenol	.28555	.31503	10.33		
4,6-Dinitro-2-methylphenol	.16304	.16844	3.31		(Conc=50.00)
N-Nitrosodiphenylamine	.48156	.50230	4.31	*	
1,2-Diphenylhydrazine	1.26267	1.33712	5.90		
4-Bromophenyl-phenylether	.18777	.19999	6.51		
Hexachlorobenzene	.28210	.29905	6.01		
Pentachlorophenol	.16372	.17763	8.50	*	(Conc=50.00)
Phenanthrene	.97893	1.02682	4.89		
Anthracene	.99321	1.06212	6.94		
Di-n-butylphthalate	1.72073	1.84120	7.00		
Fluoranthene	1.06313	1.13706	6.95	*	
Terphenyl-d14	1.03941	1.08434	4.32		
Benzidine	.57661	.65906	14.30		(Conc=200.00)
Pyrene	1.70809	1.73171	1.38		
Butylbenzylphthalate	1.20770	1.22386	1.34		
3,3'-Dichlorobenzidine	.43834	.49554	13.05		
Benzo(a)anthracene	1.03924	1.08713	4.61		
bis(2-Ethylhexyl)phthalate	1.49658	1.55638	4.00		
Chrysene	1.10401	1.14718	3.91		
Di-n-octylphthalate	3.67100	3.67292	.05	*	
Benzo(b)fluoranthene	1.27246	1.25774	1.16		
Benzo(k)fluoranthene	1.20393	1.21770	1.14		
Benzo(a)pyrene	1.10674	1.10999	.29	*	

RF - Response Factor from daily standard file at 50.00 MG/L

RF - Average Response factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

AR303213

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 07/04/92
Contractor: LANCASTER LABS Time: 13:32
Fact No: Laboratory ID: >W7205
Instrument ID: HP03301 Initial Calibration Date: 07/04/92

Minimum RF for SPCC is 0.05

Maximum % Diff for CCC is 30.0%

Compound	RF	RF	%Diff	CCC	SPCC
Indeno(1,2,3-cd)pyrene	.78033	.75464	3.29		
Dibenz(a,h)anthracene	.74523	.74496	.04		
Benzo(g,h,i)perylene	.82383	.82966	.71		

RF - Response Factor from daily standard file at 50.00 MG/L

RF - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

AR303214

Surrogate Recovery
Pesticides

Pesticide Batch # 92123 111 222

Matrix: Water

LLI Sample No.	Sample Code	S1 (DBC)	S2 (TCMX)	S3 (OXY)	S4 (DCAA)	OTHER
BLK7/6/92		95	88			
1876541		89	90			
1876541MS		102	83			
1876541MSD		101	79			
LCS7/6/92		98	75			

QC REC Limits

	Low	High
S1 (DBC) Dibutylchlorodate	20	147
S2 (TCMX) Tetrachlorometaxylene	34	123
S3 (OXY) Oxychlorodane		
S4 (DCAA) 2,4-Dichlorophenylacetic Acid		
S5 OTHER		

* = Surrogate Recovery is outside the QC limits

= No established limits

D = Surrogates diluted out I = Interferences present

Comments:

AR303215

**Surrogate Recovery
Pesticides**

PCB Batch # 92337 819 119

Matrix: SOIL

LLI Sample No.	Sample Code	S1 (DBC)	S2 (TCX)	S3 (OXY)	S4 (DCAA)	OTHER
SBLK12/15	MTHSBLK12/15		102			
1903608	08804		91			
1903609	08805		105			
SBLK12/2	MTHSBLK12/2		80			
19004008KG	3--SSBKG		83			
1900400HS	3--SSHS		97			
1900400HSD	3--SSHSD		84			
LCS12/2	LCS12/2		80			

QC REC Limits

Low High

S1 (DBC) Dibutylchlorodate
S2 (TCX) Tetrachlorometaxylene 50 120
S3 (OXY) Oxychlorodane
S4 (DCAA) 2,4-Dichlorophenylacetic Acid
S5 OTHER

* = Surrogate Recovery is outside the QC limits

= No established limits

D = Surrogates diluted out I = Interferences present

Comments:

AR303216

Method Blank
Pesticides

Pesticide Batch # 92123 111 222

Matrix... Water

Sample Information		Blank Contamination Information					
LLI Sample No.	Sample Code	CAS Number	Compound	Analysis Date	Blank Result	Units	LOQ
BLK7/6/92		319-84-6	alpha-BHC	07/07/92	ND	ug/l	0.01
1876541		319-85-7	beta-BHC	07/07/92	ND	ug/l	0.01
1876541MS		319-86-8	delta-BHC	07/07/92	ND	ug/l	0.01
1876541MSD		58-89-9	gamma-BHC (Lindane)	07/07/92	ND	ug/l	0.01
LCS7/6/92		76-44-8	Heptachlor	07/07/92	ND	ug/l	0.01
		309-00-2	Aldrin	07/07/92	ND	ug/l	0.01
		1024-57-3	Heptachlor epoxide	07/07/92	ND	ug/l	0.01
		959-98-8	Endosulfan I	07/07/92	ND	ug/l	0.01
		60-57-1	Dieldrin	07/07/92	ND	ug/l	0.01
		72-55-9	4,4'-DDE	07/07/92	ND	ug/l	0.01
		72-20-8	Endrin	07/07/92	ND	ug/l	0.01
		33213-65-9	Endosulfan II	07/07/92	ND	ug/l	0.01
		72-54-8	4,4'-DDD	07/07/92	ND	ug/l	0.01
		1031-07-8	Endosulfan sulfate	07/07/92	ND	ug/l	0.03
		50-29-3	4,4'-DDT	07/07/92	ND	ug/l	0.01
		72-43-5	Methoxychlor	07/07/92	ND	ug/l	0.05
		7421-93-4	Endrin aldehyde	07/07/92	ND	ug/l	0.1
		12789-03-6	Chlordane-Technical	07/07/92	ND	ug/l	0.05
		8001-35-2	Toxaphene	07/07/92	ND	ug/l	1
		12674-11-2	PCB-1016	07/07/92	ND	ug/l	1
		11104-28-2	PCB-1221	07/07/92	ND	ug/l	1
		11141-16-5	PCB-1232	07/07/92	ND	ug/l	1
		53469-21-9	PCB-1242	07/07/92	ND	ug/l	1
		12672-29-6	PCB-1248	07/07/92	ND	ug/l	1
		11097-69-1	PCB-1254	07/07/92	ND	ug/l	1
		11096-82-5	PCB-1260	07/07/92	ND	ug/l	1

COMMENTS:

Abbreviation Key

--- = Analysis not requested
ND = None detected
J = Estimated value below LOQ
LOQ = Limit of Quantitation
* = Outside QC Limits

Method Blank
Pesticides

PCB Batch # 92337 819 119

Matrix... SOIL

Sample Information		Blank Contamination Information					
LLI Sample No.	Sample Code	CAS Number	Compound	Analysis Date	Blank Result	Units	LOQ
SBLK12/15	MTHSBLK12/15	12674-11-2	PCB-1016	12/16/92	ND	mg/kg	0.2
1903608	08804	11104-28-2	PCB-1221	12/16/92	ND	mg/kg	0.2
1903609	08805	11141-16-5	PCB-1232	12/16/92	ND	mg/kg	0.2
		53469-21-9	PCB-1242	12/16/92	ND	mg/kg	0.2
		12672-29-6	PCB-1248	12/16/92	ND	mg/kg	0.2
		11097-69-1	PCB-1254	12/16/92	ND	mg/kg	0.2
		11096-82-5	PCB-1260	12/16/92	ND	mg/kg	0.2

COMMENTS:

Abbreviation Key

--- = Analysis not requested
ND = None detected
J = Estimated value below LOQ
LOQ = Limit of Quantitation
* = Outside QC Limits

AR303218

Lab Control Spike/Lab Control Spike Duplicate
Pesticides

Unspiked Sample #.....BLK7/6/92

Pesticide Batch # 92123 111 222

Spiked Sample #.....LCS7/6/92

Spiked Dup Sample #...

Matrix: Water

This LCS/LCSD applies to the following samples	Compound	LCS Value	LCSD Value	QC Limits	RPD	QC Limits RPD
BLK7/6/92	alpha-BHC	95		69 -110		
1876S41	beta-BHC	98		72 -108		
1876S41MS	delta-BHC	102		62 -115		
1876S41MSD	gamma-BHC (Lindane)	96		79 -120		
LCS7/6/92	Heptachlor	88		64 -115		
	Aldrin	79		59 -110		
	Heptachlor epoxide	87		80 -120		
	Endosulfan I	105		72 -106		
	Dieldrin	87		77 -120		
	4,4'-DDE	75		69 -105		
	Endrin	78		73 -120		
	Endosulfan II	98		76 -115		
	4,4'-DDD	96		71 -105		
	Endosulfan sulfate	101		63 -120		
	4,4'-DDT	83		74 -120		
	Methoxychlor	92		76 -120		
	Endrin aldehyde	79		70 -121		

ABBREVIATION KEY

LCS = Lab Control Spike LCSD = Lab Control Spike Duplicate
ND = None Detected --- = Analysis not Requested
= No established limits
RPD = Relative Percent Difference

COMMENTS:

Unspiked Sample #.....:SBLK12/2

PCB Batch # 92337 819 119

Spiked Sample #.....:LCS12/2

Matrix: SOIL

Spiked Dup Sample #...:

This LCS/LCSD applies to the following samples	Compound	LCS Value	LCSD Value	QC Limits REC	RPD	QC Limits RPD
SBLK12/15	PCB-1242	76.00		69 -115		
1903608	PCB-1260	78.00		71 -119		
1903609						
SBLK12/2						
1900400BKG						
1900400HS						
1900400HSD						
LCS12/2						

ABBREVIATION KEY

LCS = Lab Control Spike LCSD = Lab Control Spike Duplicate
ND = None Detected --- = Analysis not requested
RPD = Relative Percent Difference
= No established limits

COMMENTS:
AR303220



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Initial Calibration Report - Single Component

Run Number: 1D1303B

Configuration

Surrogates Off	R.F. Calculated using Height	RF Alarm On at > 20.00 %RSD
No RF Calibration	RT Alarm Off	Calibrate RTs Using Level
Use RT Window in Cal.File	3 Sig.Figs.in RF	4 Sig.Figs.in RT
RT Stats. On	RF Stats. On	Logo On
Print All Data		

Area Files Used for Calibration

Area file directory: C:\CP\DATA1\

(1) 1D1303B.02A	(2) 1D1303B.03A	(3) 1D1303B.04A	(4) 1D1303B.05A
(5) 1D1303B.06A	(6) 1D1303B.07A	(7) 1D1303B.08A	(8) 1D1303B.09A
(9) 1D1303B.10A	(10) 1D1303B.11A		

Calibration File

C:\CP\DATA1\PPL1B.CAL Version 438 Last Updated on 11-02-1992 16:49:26

Calibration Information

Compound Name	Runs	Std.Used	No. 3	RT	RT S.D.	RT %RSD	RT Min.	RT Max.	RT	Ave. R.F.	RT S.D.	RT %RSD	RT	Conc.	Spec
PCI	5			12.12	0.0179	0.1477	12.058	12.162		5380000	390000	7.249			
Level 1		1							12.120				5350000	.00805	
Level 2		3							12.120				5040000	.0101	
Level 3		5							12.120				5120000	.0201	
Level 4		7							12.120				5350000	.0403	
Level 5		9							12.080				6030000	.0805	
alpha-BEC	5			14.07	0.0045	0.0318	14.008	14.132		10000000	677000	6.770			
Level 1		1							14.070				10400000	.002	
Level 2		3							14.070				9900000	.0025	
Level 3		5							14.070				9330000	.005	
Level 4		7							14.070				9530000	.01	
Level 5		9							14.060				11000000	.02	
beta-BEC	5			15.39	0.0110	0.0712	15.328	15.452		3050000	208000	6.820			
Level 1		1							15.400				3370000	.004	
Level 2		3							15.390				3100000	.005	
Level 3		5							15.390				2870000	.01	
Level 4		7							15.390				2860000	.02	
Level 5		9							15.370				3030000	.04	

AR303221



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Initial Calibration Report - Single Component

Run Number: 1D1303B

Calibration Information, continued

Compound Name	Bits	Std. Used No.	3 RT	RT S.D.	RT %RSD	RT Min.	RT Max.	RT	Ave. P.P.	RF S.D.	RF %RSD	RF	Conc.	Spec
gamma-BHC	5		15.63	0.0071	0.0451	15.630	15.730		8460000	405000	4.787			
Level 1		2						15.670				9010000	.002	
Level 2		4						15.670				8640000	.0025	
Level 3		6						15.680				7570000	.005	
Level 4		8						15.670				8180000	.01	
Level 5		1						15.660				8520000	.02	
delta-BHC	5		16.84	0.0055	0.0325	16.771	16.909		7840000	813000	10.370			
Level 1		1						16.850				7750000	.004	
Level 2		3						16.840				7470000	.005	
Level 3		5						16.840				6570000	.01	
Level 4		7						16.850				7650000	.02	
Level 5		9						16.850				9150000	.04	
Heptachlor	5		19.18	0.0055	0.0266	19.130	19.230		7480000	334000	4.465			
Level 1		2						19.170				7770000	.004	
Level 2		4						19.170				7270000	.005	
Level 3		6						19.180				7140000	.01	
Level 4		8						19.170				7320000	.02	
Level 5		1						19.180				7900000	.04	
Aldrin	5		20.89	0.0100	0.0479	20.840	20.940		6620000	434000	6.556			
Level 1		2						20.870				6980000	.004	
Level 2		4						20.890				6440000	.005	
Level 3		6						20.890				6150000	.01	
Level 4		8						20.870				6360000	.02	
Level 5		1						20.860				7170000	.04	
Hept. epox exo	5		22.86	0.0130	0.0571	22.790	22.930		4910000	173000	3.523			
Level 1		2						22.830				4880000	.00404	
Level 2		4						22.840				4870000	.00506	
Level 3		6						22.860				4700000	.0101	
Level 4		8						22.850				4940000	.0202	
Level 5		1						22.860				5180000	.0404	

AR303222



Lancaster Laboratories

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Initial Calibration Report - Single Component

Run Number: 1D1303B

Calibration Information, continued

Compound Name	Hits	Std. Used No.	3 RT	RT S.D.	RT RSD	RT Min.	RT Max.	RT	Ave. R.F.	RT S.D.	RT RSD	RT	Conc.	Spec
Hept. epox endo	5		23.08	0.0100	0.0433	23.010	23.150		6030000	408000	6.766			
Level 1		2						23.060				6250000	.064	
Level 2		4						23.060				5770000	.005	
Level 3		6						23.080				5560000	.01	
Level 4		8						23.070				5980000	.02	
Level 5		1						23.080				6600000	.04	
g. Chlordane	5		24.01	0.0071	0.0295	23.940	24.090		4810000	244000	5.073			
Level 1		1						24.010				4870000	.00444	
Level 2		3						24.000				4980000	.00555	
Level 3		5						24.010				4540000	.0111	
Level 4		7						24.020				4480000	.0222	
Level 5		9						24.010				5070000	.0444	
Endosulfan I	5		24.62	0.0045	0.0182	24.570	24.670		5360000	264000	4.925			
Level 1		2						24.610				5420000	.064	
Level 2		4						24.620				5510000	.005	
Level 3		6						24.620				4950000	.01	
Level 4		8						24.620				5280000	.02	
Level 5		1						24.620				5640000	.04	
2. Chlordane	5		24.75	0.0055	0.0221	24.700	24.800		4490000	86700	1.931			
Level 1		1						24.740				4630000	.003568	
Level 2		3						24.740				4450000	.00446	
Level 3		5						24.750				4430000	.00852	
Level 4		7						24.750				4420000	.01784	
Level 5		9						24.750				4510000	.03568	
4,4'-DDE	5		25.77	0.0045	0.0174	25.715	25.825		5580000	295000	5.287			
Level 1		1						25.770				5670000	.004	
Level 2		3						25.760				5340000	.005	
Level 3		5						25.770				5470000	.01	
Level 4		7						25.770				5380000	.02	
Level 5		9						25.770				6060000	.04	

AR303223



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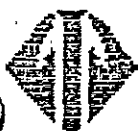
Initial Calibration Report - Single Component

Run Number: 1D1303B

Calibration Information, continued

Compound Name	Hits	Std. Used No.	3 RT	RT S.D.	RT 1/2SD	RT Min.	RT Max.	RT	Ave. R.F.	RP S.D.	RP 1/2SD	RP	Conc.	Spec
Dieldrin	5		25.89	0.0110	0.0423	25.835	25.945		5100000	229000	4.490			
Level 1		2						25.870				5280000	.004	
Level 2		4						25.870				4990000	.005	
Level 3		6						25.890				4760000	.01	
Level 4		8						25.890				5130000	.02	
Level 5		1						25.890				5320000	.04	
Endrin	5		26.94	0.0071	0.0252	26.870	27.010		4570000	304000	6.652			
Level 1		1						26.950				4970000	.004	
Level 2		3						26.930				4610000	.005	
Level 3		5						26.940				4160000	.01	
Level 4		7						26.940				4420000	.02	
Level 5		9						26.940				4700000	.04	
Endosulfan II	5		27.40	0.0045	0.0163	27.330	27.470		4080000	246000	6.029			
Level 1		2						27.390				4000000	.008	
Level 2		4						27.400				3950000	.01	
Level 3		6						27.400				3790000	.02	
Level 4		8						27.400				4240000	.04	
Level 5		1						27.400				4410000	.08	
4,4'-DDD	5		27.77	0.0130	0.0469	27.700	27.840		3870000	268000	6.925			
Level 1		1						27.790				3830000	.008	
Level 2		3						27.770				3730000	.01	
Level 3		5						27.770				3560000	.02	
Level 4		7						27.780				3970000	.04	
Level 5		9						27.800				4270000	.08	
Endrin aldehyde	5		28.30	0.0055	0.0193	28.230	28.370		2170000	110000	5.069			
Level 1		2						28.300				2160000	.01	
Level 2		4						28.310				2250000	.0125	
Level 3		6						28.300				2040000	.025	
Level 4		8						28.310				2080000	.05	
Level 5		1						28.310				2300000	.1	

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Initial Calibration Report - Single Component

Run Number: 1D1303B

Calibration Information, continued

Compound Name	Reps	Std. Used No.	3 RT	RT S.D.	RT RSD	RT Min.	RT Max.	RT	Ave. R.F.	RT S.D.	RT RSD	RT	Conc.	Spec
Kndo. sulfate	5		29.44	0.0034	0.0254	29.365	29.495		2460000	109000	4.431			
Level 1		1						29.430				2580000	.008	
Level 2		3						29.430				2410000	.01	
Level 3		5						29.440				2300000	.02	
Level 4		7						29.450				2520000	.04	
Level 5		9						29.440				2500000	.08	
4,4'-DDT	5		29.57	0.0114	0.0365	29.515	29.625		3670000	256000	6.975			
Level 1		2						29.550				3530000	.008	
Level 2		4						29.560				3530000	.01	
Level 3		6						29.570				3500000	.02	
Level 4		8						29.570				3680000	.04	
Level 5		1						29.580				4110000	.08	
Endrin ketone	5		31.67	0.0071	0.0223	31.600	31.740		3620000	312000	8.619			
Level 1		1						31.670				3800000	.008	
Level 2		3						31.660				3360000	.01	
Level 3		5						31.670				3320000	.02	
Level 4		7						31.680				3540000	.04	
Level 5		9						31.670				4060000	.08	
Methoxychlor	5		32.28	0.0045	0.0129	32.210	32.350		1740000	85100	4.891			
Level 1		2						32.280				1800000	.04	
Level 2		4						32.280				1620000	.05	
Level 3		6						32.280				1760000	.1	
Level 4		8						32.280				1830000	.2	
Level 5		1						32.290				1690000	.4	
DBC	5		33.94	0.0148	0.0437	33.870	34.010		2460000	107000	4.350			
Level 1		2						33.920				2430000	.02	
Level 2		4						33.940				2370000	.025	
Level 3		6						33.940				2350000	.05	
Level 4		8						33.950				2550000	.1	
Level 5		1						33.960				2590000	.2	



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Initial Calibration Report - Single Component

Run Number: 1D1303B

Analyst: *N. Smith* Date: 11/4/85

ChronoPerfect Version 5.05 CalibCheck Version 1.32 Reported on 11-02-1992 16:53:51

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Initial Calibration Report - Multiple Component

Run Number: 1D1303B.74

Area Files Used for Calibration

Area file directory: 1D1303B.74

Applies to Injections: 12-19

(1) 1D1303B.12 (2) 1D1303B.13 (3) 1D1303B.14 (4) 1D1303B.15
(5) 1D1303B.16 (6) 1D1303B.17 (7) 1D1303B.18 (8) 1D1303B.19
(9) _____ (10) _____ (11) _____ (12) _____
(13) _____ (14) _____ (15) _____ (16) _____

Multiple Component: **Aroclor-1016**

Calibration Levels: 1

Concentration (ug/ml): .2

Min # Peaks for Quant: 3

Max %RSD for Compnd Id: 5

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	14.050	16.150	17.090	18.420	18.910	19.290				
RT Window (mins)	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000				
Height	13465	15140	17609	36286	20917	15711				
RF (Height/Conc)	67325	75700	88045	181430	104585	78555				

Multiple Component: **Aroclor-1221**

Calibration Levels: 1

Concentration (ug/ml): .2

Min # Peaks for Quant: 3

Max %RSD for Compnd Id: 5

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	13.250	13.760	14.050							
RT Window (mins)	0.07000	0.07000	0.07000							
Height	9129	6323	20958							
RF (Height/Conc)	45645	31615	104790							



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Initial Calibration Report - Multiple Component

Run Number: 1D136587

Multiple Component: **Aroclor-1232**
Calibration Levels: 1 Concentration (ug/ml): .2
Min & Peaks for Quant: 3 Max %RSD for Compnd Id: 5

	Peak Data									
	1	2	3	4	5	6	7	8	9	10
Retention Time:	14.050	17.080	18.420	18.920	19.300	24.080				
RT Window (mins)	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000				
Height	16397	8142	16297	9057	6504	7182				
RF (Height/Conc)	81985	40710	81485	45285	32520	35910				

Multiple Component: **Aroclor-1242**
Calibration Levels: 1 Concentration (ug/ml): .2
Min & Peaks for Quant: 3 Max %RSD for Compnd Id: 5

	Peak Data									
	1	2	3	4	5	6	7	8	9	10
Retention Time:	17.090	18.450	18.920	21.770	23.260	24.090				
RT Window (mins)	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000				
Height	14283	28483	15907	12409	12182	14421				
RF (Height/Conc)	71415	142440	79535	62045	60760	72105				

Multiple Component: **Aroclor-1248**
Calibration Levels: 1 Concentration (ug/ml): .2
Min & Peaks for Quant: 3 Max %RSD for Compnd Id: 10

	Peak Data									
	1	2	3	4	5	6	7	8	9	10
Retention Time:	18.410	21.160	21.760	23.060	23.260	24.080				
RT Window (mins)	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000				
Height	18210	14505	18034	15440	15453	20401				
RF (Height/Conc)	91050	72525	90170	77200	97265	102005				

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Initial Calibration Report - Multiple Component

Run Number: 101303B.TX

Multiple Component: **Aroclor-1254**

Calibration Levels: 1
Min # Peaks for Quant: 3

Concentration (ug/ml): .2
Max %RSD for Compound Id: 30

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	23.280	24.380	25.700	26.170	27.400	29.780				
RT Window (mins)	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000				
Height	18167	24370	18306	34562	29141	29819				
RF (Height/Conc)	90835	121850	91530	174310	145955	144095				

Multiple Component: **Aroclor-1260**

Calibration Levels: 1
Min # Peaks for Quant: 3

Concentration (ug/ml): .2
Max %RSD for Compound Id: 40

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	28.450	29.790	30.570	31.670	32.950	34.570				
RT Window (mins)	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000				
Height	29383	30794	29379	22834	68238	22548				
RF (Height/Conc)	146915	153570	146895	114170	341190	114740				

Multiple Component: **Toxaphene**

Calibration Levels: 1
Min # Peaks for Quant: 3

Concentration (ug/ml): .5
Max %RSD for Compound Id: 20

Peak Data

	1	2	3	4	5	6	7	8	9	10
Retention Time:	26.910	27.980	29.970	30.580	31.190	31.640				
RT Window (mins)	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000				
Height	25279	29816	27367	23485	19924	23385				
RF (Height/Conc)	50558	59632	54734	46970	39968	46770				

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Initial Calibration Report - Multiple Component

Run Number: 101503B.7X

Multiple Component: Chlordane
Calibration Levels: 1
Min # Peaks for Quant: 3

Concentration (ug/ml): .2
Max %RSD for Compnd Id: 20

	1	2	3	4	5	6	7	8	9	10
Retention Time:	18.230	19.180	22.440	24.010	24.750	24.990				
RT Window (mins)	0.07000	0.07000	0.07000	0.07000	0.07000	0.07000				
Height	32904	78738	32645	121158	82341	75690				
RF (Height/Conc)	194520	393690	163325	605790	411865	378450				

Analyst: J. MacL

Date: 11/15/92

Reported on 11-03-1992 14:13:34

Last Calibrated on 11-03-1992 14:12:56

ChromPerfect Version 5.05

CheckPCB Version 3.22

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Lancaster Laboratories

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*** CONTINUING CALIBRATION REPORT ***

SW-846 METHOD 8080
Sample Name: 92B3W317-2 C 1.0
Instrument ID: CP1--V1300B Injected on: Nov 13, 1992 00:42:20
GC Column ID: RTX5 Raw File: C:\CP\DATA1\4D1303B.11R

RT (min)	Peak Name	Calib Factor Level 3	Calib Factor Calib Check	% RPD
12.18	TCX	5124128.	5385873.	-5.
13.15		0.	0.	0.
13.70		0.	0.	0.
14.13	alpha-BHC	9333809.	10468213.	-12.
15.46	beta-BHC	2865469.	3148607.	-10.
16.92	delta-BHC	6973324.	7628369.	-9.
17.82		0.	0.	0.
18.33		0.	0.	0.
20.96	Aldrin	6143613.	6740277.	-10.
22.42		0.	0.	0.
23.32		0.	0.	0.
23.83		0.	0.	0.
24.08	g. Chlordane	4644769.	4720913.	-2.
24.83	a. Chlordane	4434693.	4425038.	0.
25.84	4,4'-DDE	5470141.	5687004.	-4.
27.02	Endrin	4158222.	4583638.	-10.
27.87	4,4'-DDD	3560651.	3875718.	-9.
29.01		0.	0.	0.
29.53	Enco. sulfate	2298255.	2497830.	-9.
30.17		0.	0.	0.
31.05		0.	0.	0.
31.77		0.	0.	0.
32.38		0.	0.	0.
33.17		0.	0.	0.
33.54		0.	0.	0.
34.05	DSC	2346067.	2504262.	-7.
37.35		0.	0.	0.

FILES:

Area file: C:\CP\DATA1\4D1303B.11A Cal File: C:\CP\DATA1\PPL1B.CAL

Reviewed by:

R. Mack

Date:

11/13/92

AR303231



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*** CONTINUING CALIBRATION REPORT ***

-----SW-846 METHOD 8080-----

Sample Name: 92A3W317-1

C 1.0

Instrument ID: CP1--V1300B

Injected on: Nov 13, 1992 17:31:33

GC Column ID: RTX5

Raw File: C:\CP\DATA1\4D1303B.21R

RT (min)	Peak Name	Calib Factor Level 3	Calib Factor Calib Check	% RPD
15.76	gamma-BHC	7966324.	6749987.	15.
16.67		0.	0.	0.
19.30	Heptachlor	7135236.	5815216.	18.
21.01	Aldrin	6145613.	5070698.	17.
22.45		0.	0.	0.
22.99	Hept.epox exo	4697460.	3936427.	16.
23.20	Hept.epox endo	5556185.	4850832.	13.
23.71		0.	0.	0.
24.77	Endosulfan I	4952853.	4714589.	5.
25.17		0.	0.	0.
26.03	Dieldrin	4758921.	4581048.	4.
27.55	Endosulfan II	3793853.	3498905.	8.
27.95		0.	0.	0.
28.46	Endrin aldehyde	2040420.	2067160.	-1.
29.73	4,4'-DDT	3498592.	2976995.	15.
31.84		0.	0.	0.
32.47	Methoxychlor	1759868.	1429111.	19.
33.62		0.	0.	0.
34.14	DBC	2346067.	2057416.	12.
37.54		0.	0.	0.

FILES:

Area file: C:\CP\DATA1\4D1303B.21A Cal File: C:\CP\DATA1\PPL1B.CAL

Reviewed by: M. Saunders Date: 11/14/92

AR303232



Lancaster Laboratories

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*** CONTINUING CALIBRATION REPORT ***

SW-846 METHOD 8080
Sample Name: 92B3W317-2 S 1.092310572119 1224
Instrument ID: CP1--V13008 Injected on: Nov 14, 1992 11:16:35
GC Column ID: RTX5 Raw File: C:\CP\DATA1\4D1303B.30R

RT (min)	Peak Name	Calib. Factor Level 3	Calib Factor Calib Check	% RPD
12.15	TCX	5124128.	4370761.	15.
13.18		0.	0.	0.
13.69		0.	0.	0.
14.13	alpha-BHC	9333809.	8210375.	12.
15.45	beta-BHC	2965469.	2514387.	12.
16.92	delta-BHC	4973324.	5902261.	15.
19.18		0.	0.	0.
20.98	Aldrin	6145613.	5294709.	14.
22.43		0.	0.	0.
22.75		0.	0.	0.
23.32		0.	0.	0.
24.12	g. Chlordane	4644769.	3797325.	18.
24.85	a. Chlordane	4434693.	3553041.	20.
25.52		0.	0.	0.
25.88	4,4'-DDE	5470141.	4495103.	18.
27.05	Endrin	4158222.	3878496.	7.
27.89	4,4'-DDD	3560651.	3257096.	9.
29.02		0.	0.	0.
29.55	Endo. sulfate	2298255.	2060666.	10.
31.79		0.	0.	0.
33.14		0.	0.	0.
33.58		0.	0.	0.
34.09	DEB	2346067.	2245377.	4.
37.61		0.	0.	0.

FILES:

Area file: C:\CP\DATA1\4D1303B.30A Cal File: C:\CP\DATA1\PP11B.CAL

Reviewed by: M. Saunders

Date: 11/14/92

AR303233

QUALITY ASSURANCE SUMMARY

COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Name: LANCASTER LABORATORIES

...O.: TEST

Client Sample ID

Lab Sample ID .

ICP interelement corrections applied ?

Yes/No YES

ICP background corrections applied ?

Yes/No YES

If yes - were raw data generated before application of background corrections ?

Yes/No NO

LEGEND:

U = Below MDL B = Below LOO

METHODS:

FLAGS: (indicate matrix interference)

N = Matrix Spike OOS:

* = Duplicate OOS

W = Method F Analytical Spike Recovery
<85% or >115% when the sample conc.
is <50% of the spike conc.

S = Analysis Determined by MSA

+ = MSA Correlation Coefficient < 0.995

E = Matrix Effects exist as proven by

Serial Dilution or Spiked Dilution

Presence of FLAGS does not invalidate data

A = Flame Atomic Absorption

P = Inductively Coupled Plasma

F = Graphite Furnace

AS = Hydride Generation

CV = Cold Vapor

NR = Not Required

TERMS:

MDL = Method Detection Limit

LOQ = Limit of Quantitation

OOS = Out Of Specification

MSA = Method Of Standard Addition

I certify that this data package is in full compliance with the terms and conditions as specified by the NJDEP, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this data package has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature:

Name:

Date:

Title:

AR303234

QUALITY ASSURANCE SUMMARY

INORGANIC ANALYSES DATA SHEET

CLIENT SAMPLE NO.

Lab Name: LANCASTER LABORATORIES

DG No.: TEST

Matrix (soil/water): WATER

Level (low/med): LOW

Solids: 0

Lab Sample ID:

Date Received: 10/19/92

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum				NR
7440-36-0	Antimony				NR
7440-38-2	Arsenic				NR
7440-39-3	Barium				NR
7440-41-7	Beryllium				NR
	Boron				NR
7440-43-9	Cadmium				NR
7440-70-2	Calcium				NR
7440-47-3	Chromium				NR
7440-48-4	Cobalt				NR
7440-50-8	Copper				NR
7439-89-6	Iron				NR
7439-92-1	Lead				P
	Lithium				NR
7439-95-4	Magnesium				NR
7439-96-5	Manganese				NR
7439-97-6	Mercury				NR
	Molybdenum				NR
7440-02-0	Nickel				NR
7440-09-7	Potassium				NR
7782-49-2	Selenium				NR
	Silicon				NR
7440-22-4	Silver				NR
7440-23-5	Sodium				NR
	Strontium				NR
7440-28-0	Thallium				NR
	Tin				NR
	Titanium				NR
7440-62-2	Vanadium				NR
7440-66-6	Zinc				NR

Color Before:

Color After:

Clarity Before:

Clarity After:

Texture:

Artifacts:

Comments:

AR303235

QUALITY ASSURANCE SUMMARY

BLANKS

Name: LANCASTER LABORATORIES

SDG No.: TEST

Preparation Blank Matrix (soil/water):

Preparation Blank Concentration Units (ug/L or mg/kg): _____

[illegible]

AR303236

QUALITY ASSURANCE SUMMARY

SPIKE SAMPLE RECOVERY

CLIENT SAMPLE NO.

Lab Name: LANCASTER LABORATORIES

SDG No.: TEST

Matrix: WATER

Level (low/med): LOW

% Solids for Sample: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit %R	Spiked Sample Result (SSR) C	Sample Result (SR) C	Spike Added (SA)	%R	Q	M
Aluminum							NR
Antimony							NR
Arsenic							NR
Barium							NR
Beryllium							NR
Boron							NR
Cadmium							NR
Calcium							NR
Chromium							NR
Cobalt							NR
Copper							NR
Iron							NR
Lead	75-125	28.0000	28.0000	2000.00	0.0	N	P
Lithium							NR
Magnesium							NR
Manganese							NR
Mercury							NR
Molybdenum							NR
Nickel							NR
Potassium							NR
Selenium							NR
Silicon							NR
Silver							NR
Sodium							NR
Strontium							NR
Thallium							NR
Tin							NR
Titanium							NR
Vanadium							NR
Zinc							NR

NOTE: An (N) in column "Q" indicates a spike recovery that is not within the control limits. The data are considered to be valid because the laboratory control sample is within the control limits. See the Laboratory Control Sample page of the Quality Assurance Summary.

Comments:

AR303237

DUPLICATES

ame: LANCASTER LABORATORIES

SDG No.: TEST

Matrix (soil/water): WATER

Level (low/med): LOW

% Solids for Sample: 0

% Solids for Duplicate: 0

Concentration Units (ug/L or mg/kg dry weight): UG/L

Analyte	Control Limit	Sample (S)	C	Duplicate (D)	C	RPD	Q	M
Aluminum			-		-		-	NR
Antimony			-		-		-	NR
Arsenic			-		-		-	NR
Barium			-		-		-	NR
Beryllium			-		-		-	NR
Boron			-		-		-	NR
Cadmium			-		-		-	NR
Calcium			-		-		-	NR
Chromium			-		-		-	NR
Cobalt			-		-		-	NR
Copper			-		-		-	NR
Iron			-		-		-	NR
Lead			-		-		-	P
Lithium			-		-		-	NR
Magnesium			-		-		-	NR
Manganese			-		-		-	NR
Mercury			-		-		-	NR
Molybdenu			-		-		-	NR
Nickel			-		-		-	NR
Potassium			-		-		-	NR
Selenium			-		-		-	NR
Silicon			-		-		-	NR
Silver			-		-		-	NR
Sodium			-		-		-	NR
Strontium			-		-		-	NR
Thallium			-		-		-	NR
Tin			-		-		-	NR
Titanium			-		-		-	NR
Vanadium			-		-		-	NR
Zinc			-		-		-	NR
			-		-		-	
			-		-		-	
			-		-		-	

NOTE: An asterisk(*) in column "Q" indicates poor duplicate precision. The data are considered to be valid because the laboratory control sample is within the control limits. See the Laboratory Control Sample page of the Quality Assurance Summary.

AR303238

STANDARD ADDITION RESULTS

SDG No.: TEST

Concentration Units: ug/L

[illegible]

AR303239

ICP SERIAL DILUTIONS

EPA SAMPLE NO.

Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix (soil/water): _____ Level (low/med): _____

Concentration Units: ug/L

Analyte	Initial Sample Result (I)	C	Serial Dilution Result (S)	C	% Differ- ence	Q	M
Aluminum							
Antimony							
Arsenic							
Barium							
Beryllium							
Cadmium							
Calcium							
Chromium							
Cobalt							
Copper							
Iron							
Lead							
Magnesium							
Manganese							
Mercury							
Nickel							
Potassium							
Selenium							
Silver							
Sodium							
Thallium							
Vanadium							
Zinc							

LABORATORY CONTROL SAMPLE

queous LCS Source: LLI

1) Control Limits: All Metals 80-120

AR303241

ICP INTERFERENCE CHECK SAMPLE

Name: _____ Contract: _____
 Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____
 ICP ID Number: _____ ICS Source: _____

Concentration Units: ug/L

Analyte	True		Initial Found			Final Found		
	Sol. A	Sol. AB	Sol. A	Sol. AB	%R	Sol. A	Sol. AB	%R
Aluminum								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Calcium								
Chromium								
Cobalt								
Copper								
Lead								
Magnesium								
Manganese								
Mercury								
Nickel								
Potassium								
Selenium								
Silver								
Sodium								
Thallium								
Vanadium								
Zinc								

QUALITY ASSURANCE SUMMARY

INITIAL AND CONTINUING CALIBRATION VERIFICATION

Lab Name: LANCASTER LABORATORIES

SDG No.: TEST

Initial Calibration Source: LLI

Continuing Calibration Source: LLI

Concentration Units: ug/L

Analyte	Initial Calibration			Continuing Calibration					M
	True	Found	%R(1)	True	Found	%R(1)	Found	%R(1)	
Aluminum									NR
Antimony									NR
Arsenic									NR
Barium									NR
Beryllium									NR
Boron									NR
Cadmium									NR
Calcium									NR
Chromium									NR
Cobalt									NR
Copper									NR
Iron									NR
Lead	20.0	1.00	5.0	20.0	1.00	5.0			P
Lithium									NR
Magnesium									NR
Manganese									NR
Mercury									NR
Molybdenum									NR
Nickel									NR
Potassium									NR
Selenium									NR
Silicon									NR
Silver									NR
Sodium									NR
Strontium									NR
Thallium									NR
Tin									NR
Titanium									NR
Vanadium									NR
Zinc									NR

(1) Control Limits: Mercury 80-120; Other Metals 90-110; Cyanide 85-115

AR303243

QUALITY ASSURANCE SUMMARY

Method Detection Limits (Annually)

Name: LANCASTER LABORATORIES
 TEST
 Method No.: Date: 01/15/92
 Other AA Method No.:
 Furnace AA Method No.: GF_1,2,3_AQUEOU

Analyte	Wave-length (nm)	Back-ground	LOQ ** (ug/L)	MDL (ug/L)	M
Aluminum			200		NR
Antimony			200		NR
Arsenic			5		NR
Barium			100		NR
Beryllium			10		NR
Boron			40		NR
Cadmium			10		NR
Calcium			200		NR
Chromium			50		NR
Cobalt			50		NR
Copper			20		NR
Iron			100		NR
Lead	283.30	BD	3	1.0	F
Lithium			20		NR
Magnesium			100		NR
Manganese			10		NR
Mercury			0.2		NR
Molybdenum			100		NR
Nickel			50		NR
Potassium			500		NR
Selenium			3		NR
Silicon			300		NR
Silver			20		NR
Sodium			400		NR
Strontium			10		NR
Thallium			10		NR
Tin			300		NR
Titanium			10		NR
Vanadium			10		NR
Zinc			40		NR

** The LOQ must be adjusted for % Solids and Sample Weight for samples reporting in mg/Kg.

Comments:

AR303244

PREPARATION LOG

Method: P

[illegible]

AR303245

ANALYSIS RUN LOG

Instrument Name: _____ Contract: _____
 Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____
 Instrument ID Number: _____ Method: _____
 Start Date: _____ End Date: _____

[illegible]

AR303246

Method Blank
Instrumental Analysis Data

Sample Information		Method Blank Analysis							
		Matrix: WATER							
LLI	Client	Parameter	Method	Analysis Date	Meth Blank Desig.	Batch Number	Blank Result	Units	LOQ
Sample No.	Designation								
		Anion Scan							
		Fluoride	IC				---	mg/L	
		Chloride	IC				---	mg/L	
		Nitrite-N	IC				---	mg/L	
		Bromide	IC				---	mg/L	
		Nitrate-N	IC				---	mg/L	
		Phosphate	IC				---	mg/L	
		Sulfate	IC				---	mg/L	
		Ammonia-N	TAA				---	mg/L	
		Chloride	IC				---	mg/L	
		Chlorine	IC				---	%	
		Cyanide	TAA				---	mg/L	
		Cyanide							
		Reactivity	TAA				---	mg/Kg	
		Nitrite - N	IC				---	mg/L	
		Nitrate - N	IC				---	mg/L	
		Phenol	TAA				---	mg/L	
		Phosphorus	TAA				---	mg/L	
		Sulfate	IC				---	mg/L	
		TOC	TOC				---	mg/L	
		TOX	TOX				---	ug/L	
		Kjeldahl							
		Nitrogen	TAA				---	mg/L	

Comments:

ABBREVIATION KEY

IC = Ion Chromatography	---	= Analysis not requested
TAA = Technicon AutoAnalyzer	ND	= Not Detected
D = Distillation	J	= Estimated Value below LOQ
TOC = Total Organic Carbon	LOQ	= Limit of Quantitation
TOX = Total Organic Halogens	NA	= Not Applicable

AR303247

Sample Information		Matrix Spike Analysis							Matrix: WATER			
LLI	Client	Parameter	Meth	Analysis Date	Unspiked Desig.	Unspiked Result	LOQ	Spiked Desig.	Spike Added	Spiked Result	Units	%REC
		Anion Scan										
		Fluoride	IC			---				---	mg/L	
		Chloride	IC			---				---	mg/L	
		Nitrite-N	IC			---				---	mg/L	
		Bromide	IC			---				---	mg/L	
		Nitrate-N	IC			---				---	mg/L	
		Phosphate	IC			---				---	mg/L	
		Sulfate	IC			---				---	mg/L	
		Ammonia-N	TAA			---				---	mg/L	
		Chloride	IC			---				---	mg/L	
		Chlorine	IC			---				---	%	
		Cyanide	TAA			---				---	mg/L	
		Cyanide										
		Reactivity	TAA			---				---	mg/Kg	
		Nitrite - N	IC			---				---	mg/L	
		Nitrate - N	IC			---				---	mg/L	
		Phenol	TAA			---				---	mg/L	
		Phosphorus	TAA			---				---	mg/L	
		Sulfate	IC			---				---	mg/L	
		TOC	TOC			---				---	mg/L	
		TOX	TOX			---				---	ug/L	
		Kjeldahl										
		Nitrogen	TAA			---				---	mg/L	

Comments:

% Recovery Control Limit 75

% Recovery Control Limit 125

ABBREVIATION KEY

IC = Ion Chromatography	---	= Analysis Not Requested
TAA = Technicon AutoAnalyzer	ND	= Not Detected
D = Distillation	J	= Estimated Value below LOQ
TOC = Total Organic Carbon	LOQ	= Limit of Quantitation
TOX = Total Organic Halogens	NA	= Not Applicable
	*	= Out Of Specification

Sample Information		Duplicate Analysis				Matrix: WATER					
LLI	Client	Parameter	Meth	Analysis Date	1st Dup Desig.	1st Dup Result	LOQ	2nd Dup Desig.	2nd Dup Result	RPD (%)	Control Limit
Sample No.	Designation										
		Anion Scan									
		Fluoride	IC			---			---	mg/L	20
		Chloride	IC			---			---	mg/L	20
		Nitrite-N	IC			---			---	mg/L	20
		Bromide	IC			---			---	mg/L	20
		Nitrate-N	IC			---			---	mg/L	20
		Phosphate	IC			---			---	mg/L	20
		Sulfate	IC			---			---	mg/L	20
		Ammonia-N	TAA			---			---	mg/L	20
		Chloride	IC			---			---	mg/L	20
		Chlorine	IC			---			---	%	20
		Cyanide	TAA			---			---	mg/L	20
		Cyanide									
		Reactivity	TAA			---			---	mg/Kg	20
		Nitrite - N	IC			---			---	mg/L	20
		Nitrate - N	IC			---			---	mg/L	20
		Phenol	TAA			---			---	mg/L	20
		Phosphorus	TAA			---			---	mg/L	20
		Sulfate	IC			---			---	mg/L	20
		TOC	TOC			---			---	mg/L	20
		TOX	TOX			---			---	ug/L	20
		Kjeldahl									
		Nitrogen	TAA			---			---	mg/L	20

Comments:	ABBREVIATION KEY
	IC = Ion Chromatography
	TAA = Technicon AutoAnalyzer
	D = Distillation
	TOC = Total Organic Carbon
	TOX = Total Organic Halogens
	NR = Not Required
	--- = Analysis Not Requested
	ND = Not Detected
	J = Estimated Value below LOQ
	LOQ = Limit of Quantitation
	NA = Not Applicable
	* = Out Of Specification

Sample Information		Method Blank Analysis			Matrix: SOIL				
LLI	Client	Parameter	Method	Analysis Date	Method Blank Design.	Batch Number	Blank Result	Units	LOQ
Sample No.	Designation								
		Anion Scan							
		Fluoride	IC				---	mg/Kg	
		Chloride	IC				---	mg/Kg	
		Nitrite-N	IC				---	mg/Kg	
		Bromide	IC				---	mg/Kg	
		Nitrate-N	IC				---	mg/Kg	
		Phosphate	IC				---	mg/Kg	
		Sulfate	IC				---	mg/Kg	
		Chloride	IC				---	mg/Kg	
		Chlorine	IC				---	%	
		Cyanide	TAA				---	mg/Kg	
		Cyanide							
		Reactivity	TAA				---	mg/Kg	
		Nitrate-N	TAA				---	mg/Kg	
		Phenol	TAA				---	mg/Kg	
		Phosphorus	TAA				---	mg/Kg	
		Sulfate	IC				---	mg/Kg	
		Sulfur	IC				---	%	
		TOC	TOC				---	mg/Kg	
		TOX	TOX				---	mg/Kg	
		Kjeldahl							
		Nitrogen	TAA				---	mg/Kg	

Comments:

ABBREVIATION KEY

IC = Ion Chromatography	--- = Analysis not requested
TAA = Technicon AutoAnalyzer	ND = Not Detected
D = Distillation	J = Estimated Value below LOQ
TOC = Total Organic Carbon	LOQ = Limit of Quantitation
TOX = Total Organic Halogens	NA = Not Applicable

Matrix Spike Analysis
Instrumental Analysis Data

Sample Information		Matrix Spike Analysis							Matrix: SOIL			
LLI	Client	Parameter	Analysis Meth	Unspiked Date	Unspiked Desig.	Unspiked Result	LOQ	Spiked Desig.	Spike Added	Spiked Result	Units	%REC
		Anion Scan										
		Fluoride	IC			---				---	mg/Kg	
		Chloride	IC			---				---	mg/Kg	
		Nitrite-N	IC			---				---	mg/Kg	
		Bromide	IC			---				---	mg/Kg	
		Nitrate-N	IC			---				---	mg/Kg	
		Phosphate	IC			---				---	mg/Kg	
		Sulfate	IC			---				---	mg/Kg	
		Chloride	IC			---				---	mg/Kg	
		Chlorine	IC			---				---	%	
		Cyanide	TAA			---				---	mg/Kg	
		Cyanide										
		Reactivity	TAA			---				---	mg/Kg	
		Nitrate-N	TAA			---				---	mg/Kg	
		Phenol	TAA			---				---	mg/Kg	
		Phosphorus	TAA			---				---	mg/Kg	
		Sulfate	IC			---				---	mg/Kg	
		Sulfur	IC			---				---	%	
		TOC	TOC			---				---	mg/Kg	
		TOX	TOX			---				---	mg/Kg	
		Kjeldahl										
		Nitrogen	TAA			---				---	mg/Kg	

Comments:

% Recovery Control Limit 75
% Recovery Control Limit 125

ABBREVIATION KEY

IC = Ion Chromatography	--- = Analysis Not Requested
TAA = Technicon AutoAnalyzer	ND = Not Detected
D = Distillation	J = Estimated Value below LOQ
TOC = Total Organic Carbon	LOQ = Limit of Quantitation
TOX = Total Organic Halogens	NA = Not Applicable
	* = Out Of Specification

Sample Information		Duplicate Analysis				Matrix: SOIL						
LLI	Client	Analysis		1st Dup	1st Dup		2nd Dup	2nd Dup		RPD	Control	
Sample No.	Designation	Parameter	Meth	Date	Desig.	Result	LDO	Desig.	Result	Units	(%)	Limit
		Anion Scan										
		Fluoride	IC			---			---	mg/Kg		20
		Chloride	IC			---			---	mg/Kg		20
		Nitrite-N	IC			---			---	mg/Kg		20
		Bromide	IC			---			---	mg/Kg		20
		Nitrate-N	IC			---			---	mg/Kg		20
		Phosphate	IC			---			---	mg/Kg		20
		Sulfate	IC			---			---	mg/Kg		20
		Chloride	IC			---			---	mg/Kg		20
		Chlorine	IC			---			---	%		20
		Cyanide	TAA			---			---	mg/Kg		20
		Cyanide										20
		Reactivity	TAA			---			---	mg/Kg		
		Nitrate-N	TAA			---			---	mg/Kg		20
		Phenol	TAA			---			---	mg/Kg		20
		Phosphorus	TAA			---			---	mg/Kg		20
		Sulfate	IC			---			---	mg/Kg		20
		Sulfur	IC			---			---	%		20
		TOC	TOC			---			---	mg/Kg		20
		TOX	TOX			---			---	mg/Kg		20
		Kjeldahl										20
		Nitrogen	TAA			---			---	mg/Kg		20

Comments:

ABBREVIATION KEY

IC = Ion Chromatography	--- = Analysis Not Requested
TAA = Technicon AutoAnalyzer	ND = Not Detected
D = Distillation	J = Estimated Value below LOD
TOC = Total Organic Carbon	LOD = Limit of Quantitation
TOX = Total Organic Halogens	NA = Not Applicable
NR = Not Required	* = Out Of Specification

AR303252



Sample Information		Method Blank Analysis							
		Matrix: WATER							
LLI	Client	Analysis		Meth Blank		Blank			
Sample No.	Designation	Parameter	Method	Date	Desig.	Batch Number	Result	Units	LOQ
		Alkalinity							
		to pH 8.3	M				---	mg/L	1
		to pH 4.5	M				---	mg/L	1
		Ammonia							
		Nitrogen	TI				---	mg/L	1
		BOD	M				---	mg/L	2
		COD	TI				---	mg/L	50
		Free Cyanide	CO				---	mg/L	0.005
		Hexavalent							
		Chromium	CO				---	mg/L	0.02
		MBAS	CO				---	mg/L	0.02
		Oil and Grease	G				---	mg/L	0.2
		Orthophosphate	CO				---	mg/L	0.01
		pH	M				---		0.01
		Petroleum							
		Hydrocarbons	IR				---	mg/L	0.2
		Total Solids	OD				---	mg/L	10
		Total							
		Dissolved							
		Solids	OD				---	mg/L	10
		Total							
		Suspended							
		Solids	OD				---	mg/L	4
		Sulfide	TI				---	mg/L	0.1

ABBREVIATION KEY

Comments:

TI = Titration	---	= Analysis not requested
TU = Turbidimetric	ND	= Not Detected
CO = Colorimetric	J	= Estimated Value below LOQ
IR = Infrared Spectrophotometry	LOQ	= Limit of Quantitation
G = Gravimetric	NA	= Not Applicable
D = Distillation	M	= Meter
OD = Oven Dried		



Lancaster Laboratories

Where quality is a science.

Quality Control Summary

Matrix Spike Analysis

Miscellaneous Wet Chemistry

Sample Information		Matrix Spike Analysis						Matrix: WATER				
LLI	Client	Parameter	Meth	Analysis	Unspiked	Unspiked	Spiked	Spike	Spiked			
Sample No.	Designation			Date	Desig.	Result	LOQ	Desig.	Added	Result	Units	ZREC
		Alkalinity										
		to pH 8.3	M			---				---	mg/L	
		to pH 4.5	M			---	1			---	mg/L	
		Ammonia										
		Nitrogen	TI			---	1			---	mg/L	
		SCD	M			---	2			---	mg/L	
		COO	TI			---	50			---	mg/L	
		Free Cyanide	CO			---	0.005			---	mg/L	
		Hexavalent										
		Chromium	CO			---	0.02			---	mg/L	
		MBAS	CO			---	0.02			---	mg/L	
		Oil and Grease	G			---	0.2			---	%	
		Orthophosphate	CO			---	0.01			---	mg/L	
		pH	M			---	0.01			---		
		Petroleum										
		Hydrocarbons	IR			---	0.2			---	mg/L	
		Total Solids	CO			---	10			---	mg/L	
		Total										
		Dissolved										
		Solids	CO			---	10			---	mg/L	
		Total										
		Suspended										
		Solids	CO			---	4			---	mg/L	
		Sulfide	TI			---	0.1			---	mg/L	

% Recovery Control Limit 75

% Recovery Control Limit 125

Comments:

ABBREVIATION KEY

TI = Titration	---	= Analysis Not Requested
TU = Turbidimetric	ND	= Not Detected
CO = Colorimetric	J	= Estimated Value below LOQ
IR = Infrared Spectrophotometry	LOQ	= Limit of Quantitation
G = Gravimetric	NA	= Not Applicable
D = Distillation	M	= Meter
OO = Oven Dried	*	= Out Of Specification

AR303254

Sample Information		Duplicate Analysis					Matrix: WATER				
LLI	Client	Parameter	Meth	Analysis	1st Dup	1st Dup	LOQ	2nd Dup	2nd Dup	RPD	Control
Sample No.	Designation			Date	Desig.	Result		Desig.	Result		
		Alkalinity									
		to pH 8.3	M			---	1		---	mg/L	20
		to pH 4.5	M			---	1		---	mg/L	20
		Ammonia									
		Nitrogen	TI			---	1		---	mg/L	20
		BOD	M			---	2		---	mg/L	20
		COD	TI			---	50		---	mg/L	20
		Free Cyanide	CO			---	0.005		---	mg/L	20
		Hexavalent									
		Chromium	CO			---	0.02		---	mg/L	20
		MBAS	CO			---	0.02		---	mg/L	20
		Oil and Grease	G			---	0.2		---	%	20
		Orthophosphate	CO			---	0.01		---	mg/L	20
		pH	M			---	0.01		---		20
		Petroleum									
		Hydrocarbons	IR			---	0.2		---	mg/L	30
		Total Solids	OD			---	10		---	mg/L	20
		Total									
		Dissolved									
		Solids	OD			---	10		---	mg/L	20
		Total									
		Suspended									
		Solids	OD			---	4		---	mg/L	20
		Sulfide	TI			---	0.1		---	mg/L	20

Comments:

ABBREVIATION KEY

TI = Titration	--- = Analysis Not Requested
TU = Turbidimetric	ND = Not Detected
CO = Colorimetric	J = Estimated Value below LOQ
IR = Infrared Spectrophotometry	LOQ = Limit of Quantitation
G = Gravimetric	NA = Not Applicable
D = Distillation	M = Meter
OD = Oven Dried	* = Out Of Specification
NR = Not Required	

AR303255



Sample Information		Method Blank Analysis		Matrix: SOIL					
LLI Sample	Client Designation	Parameter	Method	Analysis Date	Meth Blank Desig.	Batch Number	Blank Result	Units	LOQ
		Ammonia							
		Nitrogen	D				---	mg/Kg	1
		COO	TI				---	mg/Kg	50
		Hexavalent							
		Chromium	CO				---	mg/Kg	0.2
		MBAS	CO				---	mg/Kg	
		Moisture	OO				---	%	
		Oil and Grease	G				---	%	0.2
		pH	H				---		
		Petroleum							
		Hydrocarbons	IR				---	mg/Kg	20
		Sulfide							
		Reactivity	TI				---	mg/Kg	50
		Sulfide							
		Titrimetric	TI				---	mg/Kg	5

Comments:

ABBREVIATION KEY

TI = Titration	---	= Analysis not requested
TU = Turbidimetric	ND	= Not Detected
CO = Colorimetric	J	= Estimated Value below LOQ
IR = Infrared Spectrophotometry	LOQ	= Limit of Quantitation
G = Gravimetric	NA	= Not Applicable
D = Distillation	H	= Meter
OO = Oven Dried		

AR303256

Sample Information		Matrix Spike Analysis							Matrix: SOIL			
LLI	Client	Parameter		Meth	Date	Design.	Result	LOQ	Spiked	Spike	Spiked	
Sample No.	Designation								Design.	Added	Result	Units
		Ammonia										
		Nitrogen		D			---	1			---	mg/Kg
		COD		TI			---	50			---	mg/Kg
		Hexavalent										
		Chromium		CO			---	0.2			---	mg/Kg
		MBAS		CO			---				---	mg/Kg
		Moisture		OD			---				---	%
		Oil and Grease		G			---	0.2			---	%
		pH		M			---				---	
		Petroleum										
		Hydrocarbons		IR			---	20			---	mg/Kg
		Sulfide										
		Reactivity		TI			---	50			---	mg/Kg
		Sulfide										
		Titrimetric		TI			---	5			---	mg/Kg

Comments:

% Recovery Control Limit 75
% Recovery Control Limit 125

ABBREVIATION KEY

TI = Titration	---	= Analysis Not Requested
TU = Turbidimetric	ND	= Not Detected
CO = Colorimetric	LCS	= Laboratory Control Standard
IR = Infrared Spectrophotometry	LOQ	= Limit of Quantitation
G = Gravimetric	NA	= Not Applicable
D = Distillation	M	= Meter
OD = Oven Dried	*	= Out Of Specification



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Quality Control Summary

Duplicate Analysis

Miscellaneous Wet Chemistry

Sample Information		Duplicate Analysis				Matrix: SOIL						
LLI	Client	Parameter	Meth	Analysis Date	1st Dup Desig.	1st Dup Result	LOQ	2nd Dup Desig.	2nd Dup Result	Units	RPD (%)	Control Limit
Sample No.	Designation											
		Ammonia										
		Nitrogen	D			---	1		---	mg/Kg		20
		COO	TI			---	50		---	mg/Kg		20
		Hexavalent										
		Chromium	CO			---	0.2		---	mg/Kg		20
		MBAS	CO			---			---	mg/Kg		20
		Moisture	CO			---	0.5		---	%		20
		Oil and Grease	G			---	0.2		---	%		20
		pH	M			---	0.01		---	mg/Kg		20
		Petroleum										
		Hydrocarbons	IR			---	20		---	mg/Kg		20
		Sulfide										
		Reactivity	TI			---	50		---	mg/Kg		20
		Sulfide										
		Titrimetric	TI			---	5		---	mg/Kg		20

Comments:

ABBREVIATION KEY

TI = Titration	--- = Analysis Not Requested
TU = Turbidimetric	ND = Not Detected
CO = Colorimetric	LCS = Lab. Control Standard
IR = Infrared Spectrophotometry	LOQ = Limit of Quantitation
G = Gravimetric	NA = Not Applicable
D = Distillation	M = Meter
OD = Oven Dried	* = Out Of Specification
NR = Not Required	

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Quality Control Summary

Laboratory Control Standard Analy

Miscellaneous Wet Chemistry

Sample Information		Lab Control Spike Analysis						Matrix: SOIL					
LLI	Client	Parameter	Meth	Analysis		Unspiked	Unspiked	Lab Cntrl	Lab Cntl	Lab Cntl	Units	%REC	
Sample No.	Designation			Date	Desig.	Result	LOQ		Desig.	Added			Result
		Ammonia											
		Nitrogen	D			---				---	mg/Kg		
		COD	TI			---				---	mg/Kg		
		Hexavalent											
		Chromium	CO			---				---	mg/Kg		
		MBAS	CO			---				---	mg/Kg		
		Moisture	OD			---				---	%		
		Oil and Grease	G			---				---	%		
		pH	M			---				---			
		Petroleum											
		Hydrocarbons	IR	6/17/92	BLANK	ND	20	STANDARD	5000	5132	mg/Kg	102.6	
		Sulfide											
		Reactivity	TI			---				---	mg/Kg		
		Sulfide											
		Titrimetric	TI			---				---	mg/Kg		

Comments:

% Recovery Control Limit 75

% Recovery Control Limit 125

ABBREVIATION KEY

TI = Titration	---	= Analysis Not Requested
TU = Turbidimetric	ND	= Not Detected
CO = Colorimetric	LCS	= Laboratory Control Standard
IR = Infrared Spectrophotometry	LOQ	= Limit of Quantitation
G = Gravimetric	NA	= Not Applicable
D = Distillation	M	= Meter
OD = Oven Dried	*	= Out Of Specification

AR303259

Attachment 2
ERM-FAST®
Quality Assurance Plan

AR303260

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AR303261

ATTACHMENT # 2
ON-SITE ANALYTICAL FACILITY QUALITY
ASSURANCE PLAN

ERM-FAST®
Quality Assurance Plan
(QAP)

Prepared for:
The Middletown Airfield NPL Site
Middletown, Pennsylvania

Revision 1.0, 1 July 1994

Environmental Resources Management, Inc.
855 Springdale Drive
Exton, Pennsylvania 19341

File No: PM005.02.01

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1.0

INTRODUCTION

Environmental Resources Management, Inc. (ERM, Exton, PA) has developed a field analytical service for providing high quality data in real time for the Middletown Airfield Facility Investigations at the Middletown Airfield. The ERM-Field Analytical Services Technology (ERM-FAST®) service consists of qualified chemists using laboratory-grade analytical instrumentation to perform on-site analysis of potentially contaminated matrices. It is intended that the analytical facility will serve as a tool capable of analyzing site matrices to provide both screening level (Level II) and analytical (Level III) data on-site. This information can then be utilized by project management to best direct the investigation in terms of changes in scope, additional sampling and analysis, and the selection of samples for laboratory confirmation.

1.1

ERM-FAST SERVICE DESCRIPTION

The ERM-FAST service will provide field screening data by using a Gas Chromatograph (GC) instrument equipped with dual detectors in series; an electrolytic conductivity detector (ELCD) and a photoionization detector (PID) for analysis of volatile organic and selected semivolatile organic compounds. The GC is equipped with a data integration software system and will be configured for headspace injection. The ERM-FAST service will provide field analytical data by using a Gas Chromatograph/Mass Spectrometer (GC/MS) instrument. The GC/MS is equipped with a Purge and Trap Concentrator which is interfaced directly to the column inlet on the GC. The GC/MS is also equipped with a 70 eV ion source, quadrupole and electron multiplier mass-selective detector. A 386 MHz PC with full chromatographic and spectral interpretation software, including the NIST mass spectral library database, are also included in the system.

The instrumentation and external personal computers (PCs) used in the data reporting will be housed in a cube-style truck located on site to provide data on a rapid turnaround basis. No significant effects of ambient air are anticipated due to local airport activities. The GC/MS analyses to be performed shall be carried out in a closed system with an internal helium environment. Additionally, the facility requires only reagents necessary for the analysis of volatile organics, and therefore no reagents that can potentially interfere with volatiles analyses shall be present within the field facility. The operating analytical space of the

truck will be climatically controlled by heating and air conditioning units to maintain a stable operating temperature for proper performance during analyses.

1.2 *ERM-FAST QUALITY ASSURANCE PLAN (QAP)*

The sections that follow contain detailed descriptions of all aspects related to the operation of ERM-FAST ("the field facility") on site. General areas of attention pertain to standard operating procedures, analytical methods and capabilities, and data quality control/quality assurance.

2.0

PROJECT ORGANIZATION AND RESPONSIBILITIES

While all personnel involved in an investigation and in the generation of data are implicitly a part of the overall project and quality assurance program, certain individuals have specifically delegated responsibilities. Within ERM, Inc. and ERM-FAST® these are the Technical Director, the Technical Manager, the Chief Field Chemist, the Quality Assurance Manager, Field Chemists, Field Technicians, and the Facility Schedule Coordinator. Detailed descriptions of qualifications and experience for each of the personnel involved in investigations and in the generation of data are included in Attachment 1 of this QAP.

2.1

TECHNICAL DIRECTOR

David E. Gallis, Ph.D. is the facility Technical Director (TD) for ERM-FAST. Dr. Gallis is ultimately responsible for the overall technical and analytical design for the project.

The TD maintains routine communication facility Technical Manager, Task Coordinator, and the Project Manager (as described in Section 2.6 of the QAPP) to aid in logistics and establishing analytical details. The TD serves as the prime client and agency contact on matters of analytical activities.

2.2

TECHNICAL MANAGER

Mr. David R. Catherman is the Technical Manager (TM) for ERM-FAST. He is responsible for oversight of the various technical and analytical elements of a project.

The TM maintains routine communication facility Technical Director and Task Coordinator. The TM also maintains routine contact with the field facility team to monitor on-site work and regularly review major work elements prior to submittal.

2.3 FACILITY TASK COORDINATOR

Mr. William L. Goldschmidt is the Facility Task Manager (FTC) for the project. He is responsible for coordination of the technical and analytical progress, and scheduling elements of this project. The FTC is the main communication link between the field personnel and the Project Manager (as described in Section 2.6 of the QAPP).

The FTC maintains routine contact with the field facility team to assure project work is being completed as scheduled. The FTC oversees all scheduling and budgeting for the field analytical services.

2.4 QUALITY ASSURANCE MANAGER

Ms. Shawne M. Rodgers serves as Quality Assurance Manager (QAM) on all projects requiring the collection of data, and as such is not directly involved in the routine performance of technical aspects of the investigations.

The QAM's responsibilities include the evaluation and review of the Quality Assurance Project Plan and final analytical reports.

2.5 CHIEF FIELD CHEMIST

Ms. Cheri A. Pearson is the Chief Field Chemist for the facility. Her primary responsibility is the on-site supervision and use of the field facility. This includes all aspects of preparation and analysis of samples, data compilation, and tracking quality control sample analysis frequency and integrity. Additionally, she is responsible for maintenance and up-keep of the facility, assisting in method development, and training and direction of other Field Chemists and Technicians with respect to facility analytical instrumentation.

2.6 FIELD CHEMIST

Mr. Michael Osterhault is the field facility Field Chemist. His primary responsibilities include all aspects of preparation and analysis of samples, data compilation, and tracking quality control sample analysis frequency and integrity. Mr. Osterhault will also monitor all aspects of sample custody, storage, and preparation for analysis.

2.6

FIELD TECHNICIAN

Ms. SueEllen Doty is the field facility Field Technician. Her primary responsibilities include all aspects of sample custody, storage, and preparation for analysis. She is also a vital communications link between field sampling personnel and the field analytical facility. Additionally, she may assist the field sampling team in the procurement of samples if it is deemed appropriate by the Project Manager (PM).

3.0 **QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA IN TERMS OF PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY, AND COMPLETENESS**

3.1 **OVERALL OBJECTIVES**

Data Quality Objectives (DQO) are quantitative and qualitative statements specifying the quality of the environmental data generated on site by the field screening unit to support the decision-making process. DQO define the total uncertainty in the data that is acceptable for each specific activity during the investigation. This uncertainty includes both sampling error and analytical error. Ideally, zero uncertainty is the intent; however, the variables inherently associated with the process (field sampling and analysis) contribute to uncertainty in the field data. It is the overall objective to keep the total uncertainty within an acceptable range that will not hinder the intended use of the field data. In order to achieve this objective, data quality requirements such as quantitation limits, criteria for accuracy and precision, sample representativeness, data comparability, and data completeness have been specified. The overall data quality objectives and requirements will be established such that there is a high degree of confidence in the measurements performed. The data collected in the field by the screening unit during the course of an investigation will be used to answer the following questions.

1. Are targeted compounds present or absent in the matrices (qualitatively)?
2. If targeted compounds are present, what quantities (concentrations) are present in the matrices (quantitative)?
3. What is the need for additional and/or expanded analyses?

The sample media that will be collected to answer these questions will be soils, soil vapor, and ground water as determined by the Project Manager. As previously stated, the parameters that will be used to specify data quality requirements and to evaluate the analytical system performance are precision, accuracy, representativeness, completeness, and comparability (PARCC). Table 3-1 defines all of these parameters.

Table 3-1 Definitions of Data Quality Parameters

-
- Precision - a measure of the reproducibility of measurements under a given set of conditions.
 - Accuracy - a measure of the bias that exists in a measurement system.
 - Representativeness - the degree to which sample data accurately and precisely represent selected characteristics.
 - Completeness - a measure of the amount of valid data obtained from the measurement system compared to the amount that is required.
 - Comparability - a measure of confidence with which one data set can be compared with another.
-

3.2

FIELD INVESTIGATION QUALITY OBJECTIVE

The objective with respect to the field investigation is to maximize the confidence in the field data in terms of PARCC.

Section 8.1 presents the frequency with which method blanks, field duplicates, field blanks, matrix spike samples and continuing calibration checks will be analyzed by the field screening unit such that a specific degree of precision and accuracy can be calculated. The data quality objective for field duplicates is to achieve precision equal to or greater than that summarized on Table 3-2.

Precision will be calculated as the relative percent difference (RPD) or percent difference (%D) if there are only two (2) analytical points and as relative standard deviation (RSD) if there are more than two (2) analytical points. The analysis of method blanks, field blanks, continuing calibration checks, and matrix spike samples will provide a check on accuracy. Although accuracy can be assessed by evaluating the results of blanks, blanks do not monitor analyte losses. The analyte loss will be checked by the evaluation of the matrix spike samples, as well as internal standard recoveries and surrogate recoveries on a sample by sample basis. The analysis of blanks will, however, monitor contaminants introduced with the sampling process, preservation, handling, and the analytical process.

The data quality objective for method blanks and field blanks is to meet or exceed the Practical Quantitation Limits (PQLs) for the analyses. The PQLs for the field facility screening protocols are specified in Section 6, Table 6-1.

In the event that the analysis of quality control samples proves contamination and/or poor recovery, the associated data will be qualified as described in Section 10.3. Through the submission of field QC samples, the distinction can be made between facility problems, sampling technique, and sample matrix variability.

Table 3-2 Criteria Objectives for GC Screening Data

Field Facility Objectives for Selected Volatile/Semivolatile Fractions			
Precision Objectives	Soil	Soil Vapor	Water
Field Duplicate			
(Blind or Labeled)	Within 35% RPD	NA	Within 35% RPD
Field Analysis Replicates	Within 35% RPD	Within 35% RPD	Within 35% RPD
Initial Calibration	Within 30% RSD	Within 30% RPD	Within 30% RSD
Continuing Calibration Checks	Within 30% D	Within 30% D	Within 30% D
Accuracy Objectives	Soil	Soil Vapor	Water
Field or Method Blanks	Less than the PQL	Less than the PQL	Less than the PQL
Matrix Spiked Samples	70-130% Recovery	NA	90-110% Recovery

NA = Not Applicable

Table 3-3 Criteria Objectives for GC/MS Analytical Data

Field Facility Objectives for Volatile Organic Compounds	
Precision Objectives	Soil
Field Duplicate (Blind or Labeled)	Within 35% RPD
Field Analysis Replicates	Within 35% RPD
Initial Calibration	Within 30% RSD
Continuing Calibration Checks	Within 25% D
Accuracy Objectives	Soil
Field or Method Blanks	Less than the PQL
Matrix Spiked Samples	75-125% Recovery
Internal Standards	-50 to +100% of ICAL Signals
Surrogate Standards	As per Method 8260

3.3 FIELD FACILITY DATA QUALITY OBJECTIVES

The screening facility will demonstrate analytical precision and accuracy by the analysis of method blanks, field duplicates, matrix spikes, calibration check standards, internal standards (GC/MS analyses only), and surrogate compounds (GC/MS analyses only). Precision (as well as instrument stability) will also be demonstrated by comparison of replicated response of calibration check standards and by the comparison of duplicate analysis data. Facility screening accuracy will be demonstrated by the addition of analytes spiked into a representative matrix, and also by the analysis of field and method blanks. Facility accuracy for GC/MS analyses will be demonstrated by the specific procedures listed in the Standard Operating Procedure (SOP) for GC/MS analysis attached to this QAP (Attachment 2). The SOP is identical to SW-846 Method 8260, Revision 0, July 1992. Accuracy will be presented as percent recovery (%R).

The field chemist will process an aliquot of sample such that the analytical results will provide a high degree of representativeness with respect to the

sampling point. In addition, the field chemist will document all analytical problems encountered during the course of the investigation and determine if any problems affect the quality of the data. Communication will be maintained with the Facility Task Manager and/or Project Manager so that analytical problems encountered with critical sample points will allow these samples to be re-collected and/or reanalyzed without delay. Furthermore, ERM-FAST services will provide data deliverables sufficient to ensure that analytical methods, parameters, level of QC and reporting units are consistent throughout an investigation.

3.4 CRITERIA OBJECTIVES

The quantitative accuracy and precision objectives (criteria) that ERM-FAST will require for the field facility are summarized in Table 3-2 and Table 3-3. The precision and accuracy objectives are set for soil, soil vapor, and water matrices for each quality control parameter.

The Practical Quantitation Limits (PQLs) for the seventeen site specific volatile and semivolatile organic compounds for GC screening are listed in Table 6-1. The PQLs are 5 micrograms per liter ($\mu\text{g/L}$) water, 10 micrograms per kilogram ($\mu\text{g/kg}$) soil, and 5 $\mu\text{g/L}$ soil vapor. The PQLs for the Target Compound List (TCL) Volatile Organic Compounds (VOCs) for GC/MS analysis are listed in Table 6-2. The PQLs are 25 $\mu\text{g/Kg}$ soil. However, it should be noted that actual quantitation limits are sample specific and depend on variables such as dilution factors, samples matrices, percent moisture, and the specific analyte. The data reported at or near the PQL will be handled cautiously since the stated data quality objectives for accuracy and precision may not "translate" well in some situations (i.e., accuracy and precision suffer for results approaching the PQL).

3.5 DATA MANAGEMENT OBJECTIVES

It is a data management objective that all aspects of a field analytical investigation for sample preparation and analysis use/decisions, etc. be performed in conjunction with thorough and appropriate QA/QC documentation. The specific details of this documentation can be found throughout this document.

It is expected that, by the design of separate data quality requirements for field sampling, field analysis and laboratory analysis, clear distinctions

can be made such that any problems found in the system can be isolated with respect to the cause. Conversely, the data quality requirements are also designed to provide an indication of the variability inherent to the overall system.

The overall data management objective is to provide a complete database with a high degree of confidence through the use of a unified approach of sampling, analysis, data assessment (data review) and data qualification (data validation).

4.0 **SAMPLE CUSTODY**

4.1 **SAMPLE CUSTODY OBJECTIVES**

The primary objective of sample custody procedures is to create an accurate written record which can be used to trace the possession and handling of all samples from the moment of their collection, through analysis and up to their final disposition. Custody for samples collected during an investigation will be maintained by the Field Operations Manager (FOM) or the field personnel collecting the samples, as well as the field facility chemist and technician according to the procedures stated in the QAPP. The FOM, chemist, technician, or the field personnel will be responsible for documenting each sample transferred on site, and maintaining custody of all samples designated for analysis by the commercial laboratory until they are shipped to the laboratory.

The facility chemist and technician will complete the Cooler Receipt Form recording time, date, and name of recipient, and will also note any damaged sample containers or discrepancies between sample chain of custody (COC) and site-specific sample information on the sample container. These discrepancies will also be communicated to the FOM or field sampling personnel, so that proper action can be taken. Full documentation of problems encountered with samples and any action taken will be recorded by the Field Technician on the chain of custody forms and in the field facility log book.

4.2 **SAMPLE STORAGE**

Samples will be stored in a cooler with sufficient double bagged conventional ice to ensure that proper temperature is maintained ($4^{\circ}\text{C} \pm 2^{\circ}$), before and after analysis. All sample aliquots that will be removed by the facility chemist will be recorded and entered by mass or volume, whichever is applicable, in the field facility log book and data base as described in Section 7.0.

5.0 CALIBRATION PROCEDURES AND FREQUENCY

5.1 FIELD FACILITY GC INSTRUMENTATION STANDARDIZATION

5.1.1 Soil and Water Samples

The seventeen site-specific volatile and semivolatile organic compounds listed in Table 6-1 will be screened by the gas chromatograph (GC) prior to the start of the sample screening on site. These will be prepared as aqueous standards at three concentrations (10, 50, and 200 parts per billion). Calibration data obtained from these standards will be used to generate a three-point calibration curve which must pass Relative Standard Deviation (RSD) criteria as listed on Table 3.2. Intensity data obtained from these standards will be used to generate compound-specific Calibration Factors (CFs). The predetermined CF values will be used to quantitate concentrations of compounds of interest in samples screened at the site. A mid-range standard (50 ppb) will be screened as a Continuing Calibration Check (CCC) standard once in every 20 samples screened. Results from CCC analyses will be used to evaluate on-going GC instrument performance with respect of the initial CF values obtained from three-point standardization. If it is determined that any CCC standard analysis is outside criteria for a given analyte ($%D > 30$), the initial standardization will be performed and RSD criteria for the three-point calibration curves will be met prior to the continuation of soil and water sample screening.

5.1.2 Soil Vapor Samples

The seventeen site-specific volatile and semivolatile organic compounds listed in Table 6-1 will be screened by the gas chromatograph (GC) prior to the start of the sample screening on site. These will be prepared as vapor standards at three concentrations [1, 5, and 10 micrograms per liter air ($\mu\text{g}/\text{L}_{\text{air}}$)]. Calibration data obtained from these standards will be used to generate a two-point calibration curve (mid and high level standards) which must pass Relative Percent Difference (RPD) criteria as listed on Table 3.2. Intensity data obtained from these standards will be used to generate compound-specific Calibration Factors (CFs). The predetermined CF values will be used to quantitate concentrations of compounds of interest in samples screened at the site. A mid-range

standard (5 µg/L_{air}) will be screened as a Continuing Calibration Check (CCC) standard once in every 20 samples screened. Results from CCC analyses will be used to evaluate on-going GC instrument performance with respect of the initial average CF values obtained from two-point standardization. If it is determined that any CCC standard analysis is outside criteria for a given analyte (RPD >30%), the three-point standardization will be performed and RPD criteria for the two-point calibration curve will be met prior to the continuation of soil vapor sample screening.

5.2 FIELD FACILITY GC/MS INSTRUMENTATION CALIBRATION AND STANDARDIZATION

5.2.1 GC/MS Mass Calibration

Calibration procedures will follow the protocols listed in the SOP (SW-846 Method 8260, Revision 0, July 1992).

In order to ensure that all sample analyses are performed with stable instrument operation, the GC/MS unit will be initially calibrated using an automated calibration procedure designed by the instrument manufacturer using decafluorotriphenylphosphine (DFTPP). The automated calibration procedure consists of a calibrant gas that is introduced directly into the mass spectrometer. The calibration is conducted by the instrument software such that the detector and optics settings are electronically optimized over the mass range (mass axis offset of gain). This calibration will be performed prior to the start of on-site analyses. The calibration will then be manually checked daily by the Chief Field Chemist prior to, during and after field analysis each day using SW846 bromofluorobenzene (BFB) tuning criteria. If the instrument is deemed to be out of calibration at any time, the automated calibration will be repeated until calibration is within the specified criteria.

5.2.2 GC/MS Standardization

Standardization procedures will follow the protocols listed in the SOP (SW-846 Methods 8260, Revision 0, July 1992).

Five known (traceable) and varying concentrations of the Target Compound List (TCL) Volatile Organic Compounds will be analyzed by the on-site analytical facility prior to performing sample analyses at the

site. These will be prepared as aqueous standards at five concentrations (10, 25, 50, 200, 500 parts per billion). Intensity data obtained from these standards and internal standards will be used to generate specific Relative Response Factors (RRFs). The RRF of the mid-point standard will be used to quantitate sample concentrations of the compounds of interest if samples are analyzed directly after initial calibration. Otherwise, RRF values for the previous continuing calibration standard will be used. A mid-range standard will be analyzed as a Continuing Calibration Check standard (CCC) containing all compounds of interest every 12 hour shift and repeated after the analysis of 20 samples within that 12 hour shift. The RRFs from CCC analyses will be used to evaluate sample concentrations and on-going GC/MS instrument performance (by checking the SPCCs and CCCs as described in sections 7.4.3 and 7.4.4 of the method, respectively) with respect to the initial RRF values obtained. If and CCC compound demonstrates a deviation greater than 25% difference a new initial calibration will be performed. The CCC will be prepared from different stock than that of the initial calibration standards. If it is determined that any CCC analysis is outside criteria for a given analyte, a new initial calibration will be performed. For all analyses, pentafluorobenzene, 1,4-difluorobenzene, chlorobenzene-d₅, and 1,4-dichlorobenzene-d₄ will be used as internal standards. During routine operation, changes less than 50% or greater than 100% of the average initial calibration internal standard signal will be considered a suspect event, and will require sample reanalysis.

6.0 ANALYTICAL PROCEDURES

All standard operating procedures for the on-site analytical facility are included in Attachment 2 of this QAP.

6.1 FIELD FACILITY ANALYTICAL PROCEDURES

All analytical procedures to be used by the field facility have been developed to provide rapid turn-around analytical results. All analytical methods and sample processing protocols have been developed and field tested by ERM-FAST using analytically pure reagents and certified standards.

Table 6-1 and Table 6-2 present the Practical Quantitation Limits (PQLs) for the site-specific volatile and semivolatile organic compounds to be analyzed by ERM-FAST screening and analysis methods.

6.2 FIELD FACILITY ORGANICS SCREEN, GC/PID/ELCD

The site-specific organic compounds will be analyzed by high-resolution Gas Chromatography (GC) utilizing a Photoionization Detector (PID) and an Electrolytic Conductivity Detector (ELCD) in series by direct injection of headspace as described in the SOP which is included in Attachment 2 of this ERM-FAST QAP.

Water and soil samples will be prepared for analysis by placing a measurable (by weight) amount of sample into a tared vial with a teflon-lined septum. The amount of the sample added to the vial will be equal to the amount of water utilized in the preparation of the standards. Therefore, the headspace in the standard and in the sample will be of equal volume. An aliquot of the headspace will then be directly injected into the calibrated GC/PID/ELCD.

Soil vapor samples will be collected from the field sampling point directly into 1-Liter Tedlar® bags manufactured for environmental gaseous sample collection. An appropriate aliquot of soil vapor sample from the bag will be withdrawn through the Teflon®

septum with a Hamilton gas tight syringe, and injected into the calibrated GC/PID/ELCD.

6.2.1

Qualitative Identification and Quantitative Determination Procedures for Organics Screen

Qualitative identifications for site-specific compounds detected in the samples will be made by referencing the sample retention time data against the retention time of the compounds in the standards. The data integration software package will utilize calibration factors from the initial calibration curve to quantitatively evaluate the concentration of the site-specific compounds in the samples as described in the SOP which is included in Attachment 2 of this ERM-FAST QAP.

Table 6-1 ERM-FAST® Field Facility Site Specific Compounds and Practical Quantitation Limits for GC/PID/ELCD Screen of Volatile and Semivolatile Organic Compounds

Organic Compound	CAS Number	Estimated Reporting Limits ^a		
		Low Water µg/L	Low Soil ^a µg/Kg	Low Soil Vapor µg/L _{air}
1. Vinyl Chloride	75-01-4	5	10	5
2. Carbon Tetrachloride	75-35-4	5	10	5
3. 1,2-Dichloroethane	75-35-3	5	10	5
4. cis-1,2-Dichloroethene	540-54-0	5	10	5
5. trans-1,2-Dichloroethene	540-54-0	5	10	5
6. Tetrachloroethene	127-18-4	5	10	5
7. Trichloroethene	79-01-6	5	10	5
8. Chlorobenzene	108-90-7	5	10	5
9. 1,2-dichlorobenzene	95-50-1	5	10	5
10. 1,3-dichlorobenzene	541-73-1	5	10	5
11. 1,4-dichlorobenzene	106-46-7	5	10	5
12. benzene	71-43-2	5	10	5
13. toluene	108-88-3	5	10	5
14. Ethylbenzene	100-41-4	5	10	5
15. o-xylene	95-47-6	5	10	5
16. m-xylene	108-38-3	5	10	5
17. p-xylene	106-42-3	5	10	5

a Estimated reporting limits for soil/sediment are based on wet weight. Individual sample reporting limits will be different based on dry weight correction.

All sample quantitations reported by the field facility GC/PID/ELCD screening method are to be taken as provided on a screening-level basis. This implies that, by nature, the inherent factors at play when conducting analyses in the field necessarily impact the quality of the data obtained.

Field screening data is wholly valid but may (or may not) be less accurate than the data obtained from a stable, controlled laboratory environment. The ERM-FAST Field Chemist under the direction of the Technical Manager and Quality Assurance Manager will review all quantitative results generated by the field facility with respect to the accuracy and precision of the analytical methods. Any results requiring qualification will be based on field facility performance of the quality control procedures outlined in the quality assurance guidelines mentioned throughout this document.

6.3 ORGANICS ANALYSIS, GC/MS

The Target Compound List (TCL) Volatile Organic Compounds (VOCs) plus Tentatively Identified Compounds (TICs) will be analyzed by high-resolution Gas Chromatography/Mass Spectrometry (GC/MS). Sample preparation for soil matrix will involve the purge and trap mechanism. As inert gas is bubbled through aqueous media, VOCs present in the sample are evolved and retained on a sorbent trap. The sorbent trap is interfaced directly to the GC which allows the retained VOCs to be thermally desorbed into the analytical system where they are separated on a capillary GC column and detected by the mass spectrometer (MS).

6.3.1 *Qualitative and Quantitative Procedures for Compound Identification and Quantitation During Organics Analysis*

Qualitative identifications for TCL VOCs plus TICs are made by referencing the sample spectral data against computer-searched library data base reference spectra. Additionally, the field facility will utilize calibrated relative response factors (RRF) and instrument specific mass spectra for quantitative and qualitative determinations of the TCL VOCs. These sample and standard spectra will also be compared for qualitative matching. Chromatographic retention time will also be used for the definitive TCL VOC identification. TICs will be quantitated using a RRF of unity. Additional procedures pertaining to the use of RRFs for quantitation purposes are outlined in the SOP for organics analysis found in Attachment 2 of this QAP.

The ERM-FAST Technical Manager and Quality Assurance Manager will review all quantitative results generated by the field facility with respect to the accuracy and precision of the analytical methods. Any results requiring qualification will be based on field facility performance of the

quality control procedures outlined in the quality assurance guidelines mentioned throughout this document.

6.4 STANDARDS AND STORAGE

6.4.1 *Standards and Storage for GC Screen*

All standards used in the field are prepared as secondary dilution standards from a primary custom stock standard solution supplied from Supelco, Inc. of Bellefonte, PA. All primary standards are stored in a dedicated refrigerator located inside the trailer at or below 4°C. A thermometer will be present in the refrigerator to ensure the condition of the unit is sufficient to maintain required temperature. Expiration times for compounds in the custom standard mix solution are listed in Table 6-3.

6.4.2 *Standards and Storage for GC/MS Analysis*

All standards used in the field are prepared as secondary dilution standards from primary stock standard solutions (TCL Volatiles Mixes 1 through 5) supplied from Supelco, Inc. of Bellefonte, PA. All primary standards are stored in a dedicated refrigerator located inside the trailer at or below 4°C. A thermometer will be present in the refrigerator to ensure the condition of the unit is sufficient to maintain required temperature. Expiration times for compounds in the primary and secondary standard mix solutions are listed in Table 6-4.

Table 6-2 ERM-FAST® Field Facility Target Compound List Volatile Organic Compounds and Practical Quantitation Limits for GC/MS Analysis

<u>Volatiles</u>	<u>CAS Number</u>	<u>Estimated Reporting Limits^a</u>
		Low Soil ug/Kg
1. Chloromethane	74-87-3	25
2. Bromomethane	74-83-9	25
3. Vinyl Chloride	75-01-4	25
4. Chloroethane	75-00-3	25
5. Methylene Chloride	75-09-2	25
6. Acetone	67-64-1	25
7. Carbon Disulfide	75-15-0	25
8. 1,1-Dichloroethene	75-35-4	25
9. 1,1-Dichloroethane	75-35-3	25
10. 1,2-Dichloroethene (total)	540-54-0	25
11. Chloroform	67-66-3	25
12. 1, 2-Dichloroethane	107-06-2	25
13. 2-Butanone	78-93-3	200
14. 1,1,1-Trichloroethane	71-55-6	25
15. Carbon Tetrachloride	56-23-5	25
16. Bromodichloromethane	75-27-4	25
17. 1,1,2,2-Tetrachloroethane	79-34-5	25
18. 1,2-Dichloropropane	78-87-5	25
19. cis-1,3-Dichloropropene	10061-01-5	25
20. Trichloroethene	79-01-6	25
21. Dibromochloroemthane	124-48-1	25
22. 1,1,2-Trichloroethane	79-00-5	25

Table 6-2 (cont'd)

<u>Volatiles</u>	<u>CAS Number</u>	<u>Estimated Reporting Limits^a</u>
		Low Soil µg/Kg
23. Benzene	71-43-2	25
24. trans-1,3-Dichloropropene	10061-02-6	25
25. Bromoform	75-25-2	25
26. 2-Hexanone	591-78-6	25
27. 4-Methyl-2-Pentanone	108-10-1	25
28. Tetrachloroethane	127-18-4	25
29. Toluene	108-88-3	25
30. Chlorobenzene	108-90-7	25
31. Ethyl Benzene	100-41-4	25
32. Styrene	100-42-5	25
33. p-Xylene	106-42-3	25
33. m-Xylene	108-38-3	25
33. o-Xylene	95-47-6	25

^a Estimated reporting limits for soil/sediment are based on wet weight. Individual sample reporting limits will be different based on dry weight correction.

Table 6-3 GC Screen Compounds Expiration Times

Organic Compound	Primary Custom Standard Mix	Secondary Dilution Standards
1. Vinyl Chloride	3 months	1 month
2. Carbon Tetrachloride	3 months	1 month
3. 1,2-Dichloroethane	3 months	1 month
4. cis-1,2-Dichloroethene	3 months	1 month
5. trans-1,2-Dichloroethene	3 months	1 month
6. Tetrachloroethene	3 months	1 month
7. Trichloroethene	3 months	1 month
8. Chlorobenzene	3 months	1 month
9. 1,2-dichlorobenzene	3 months	1 month
10. 1,3-dichlorobenzene	3 months	1 month
11. 1,4-dichlorobenzene	3 months	1 month
12. benzene	3 months	1 month
13. toluene	3 months	1 month
14. Ethylbenzene	3 months	1 month
15. o-xylene	3 months	1 month
16. m-xylene	3 months	1 month
17. p-xylene	3 months	1 month

Table 6-4 GC/MS Analysis TCL Volatiles Standard Solutions Expiration Times

Standard	Primary	Secondary
TCL Volatiles Mix stds	3 months	1 month
Volatile internal stds	3 months	1 month
Volatile surrogate stds	3 months	1 month
Volatile matrix spike stds	3 months	1 month

7.0

DATA REPORTING, REVIEW AND REDUCTION

Data review practices will be followed to ensure that raw data (logbooks, instrument printouts, and field analytical data deliverables) are not altered and that an audit trail is developed for those data which required reduction. All field facility analytical notes will be recorded in a bound notebook. Each project team member will be responsible for proofing all data transfers, while the Project Manager and the Technical Manager will proof at least ten percent of all data transfers.

Data produced from the field facility will be quantitatively and qualitatively reviewed by ERM's Quality Assurance Chemist as identified in Section 2.8 of the QAPP. Data review is discussed in detail in Section 10.

All organic data obtained during the course of the investigation for soil matrices will be reported in units of micrograms per kilogram matrix ($\mu\text{g}/\text{Kg}$). All organic data obtained for aqueous matrices will be reported in units of micrograms per liter ($\mu\text{g}/\text{L}$). All organic data obtained for soil vapor matrices will be reported in units of parts per million weight per unit volume ($\text{ppm}_{\text{weight/volume}}$) and referenced as micrograms per liter air ($\mu\text{g}/\text{L}_{\text{air}}$). Results for organic data will be reported in the field on an "as received" basis. Data deliverables for the field GC screening and GC/MS analyses of samples will be produced by a Field Chemist. These field deliverables will be in spreadsheet format and will include the following information: site-specific organic compounds, relative response factors, sample location identification, ERM-FAST facility analysis log number, sample collection date, date of analysis, operator initials, and quantitative results.

A QA/QC summary of each day's analyses will be compiled with copies of the daily field deliverables for the duration of the project. This QA/QC summary will include continuing calibration, MS tune results, blank analyses, matrix fortified analyses, and sample chain of custody forms.

ERM-FAST will require a rigorous data control program which will ensure that all documents for the investigation are accounted for as they are completed. Accountable documents include items such as logbooks, field data records, correspondence, chain-of-custody records, field analytical data deliverables, computer archives, instrument printouts, and reports.

The Project Manager is responsible for maintaining a central file in which all accountable documents will be inventoried.

The documentation of sample analyses will include the use of bound notebooks in which all information pertaining to sample analysis will be entered in indelible ink. Appropriate information on sample identification (SI) number, sample location, date and time of sampling and analysis, sample matrix, analysis to be performed, methodology to be used, analytical problems encountered, corrective action taken and the analyst's initials will be included in the notebook.

The Field Chemist will perform daily electronic archiving to 150 Megabyte Bernoulli disks. When full the Bernoulli disks shall be removed from the field facility and stored at the field operations trailer for safekeeping.

8.0

INTERNAL QUALITY CONTROL CHECKS

8.1

FIELD FACILITY INTERNAL QUALITY CONTROL CHECKS

Field Internal Quality Control (QC) Checks will be utilized during GC screening and GC/MS analytical investigations through the use of the following:

- Method Blanks - Analytical method blanks are prepared from a gaseous, solid and/or aqueous matrix known to be free of targeted compounds. This medium will be processed and analyzed in exactly the same manner as all samples analyzed by the field facility. These blanks will be screened and analyzed for all targeted compounds at a frequency of one per twenty (20) samples screened and analyzed.
- Duplicate Samples - Blind duplicate samples will be collected to allow determination of analytical precision. One blind duplicate sample for every twenty (20) water or soil samples collected will be submitted for field facility screening and analysis. The field facility will also screen and analyze a duplicate sample from the same sample location designated to be submitted to the commercial facility for confirmation analysis. This will provide added data on analytical precision between the field facility and commercial laboratory.
- Replicate Samples - Replicate samples will be screened and analyzed by the field facility to allow determination of analytical precision. One replicate sample for every twenty (20) water or soil samples screened and analyzed will be submitted for field facility screening and analysis.
- Field Blanks - Field Blanks will be carried through all of the stages of sample collection. These blanks will monitor contamination introduced via sample collection apparatus. These blanks will be screened and analyzed for all targeted compounds at a frequency of one per sampling event.
- Matrix Spike Sample - Matrix Spike (MS) samples will also be submitted as further QC checks. These samples will be spiked at the field facility for subsequent analysis. These will be analyzed at a frequency of one MS sample for every twenty (20) soil and water samples screened and analyzed (including blind duplicates). These analyses will allow the accuracy of analyte quantitation to be

determined based on percent recovery (%R) of a given analyte. The purpose of these MS samples is to also monitor any possible matrix effects specific to samples collected from the site. The addition of known concentrations of target analyte to an authentic site sample also monitors sample preparation and screening and analysis efficiency.

- Continuing Calibration Checks - The field facility will analyze a continuing calibration check standard to determine if the instrument calibration is deviating from the linearity in the initial calibration response factors. These calibration checks will be performed at a frequency of one per twenty samples screened and analyzed or each 12 hours of operation, whichever is more frequent.
- Surrogate Standard Compounds - 4-bromofluorobenzene, 1,2-dichloroethane-d4, and toluene-d8 will be used as surrogate standard compounds during Level III GC/MS analyses only. Each of these compounds will be spiked into all soil and QC samples at 50 µg/Kg prior to analysis by purge-and-trap GC/MS for targeted volatile organic compounds.
- Internal Standard Compounds - Pentafluorobenzene, 1,4-difluorobenzene, chlorobenzene-d5, and 1,4-dichlorobenzene-d4 will be used as internal standard compounds during Level III GC/MS analyses only. Each of these compounds will be spiked into all soil and QC samples at 50 µg/Kg prior to analysis by purge-and-trap GC/MS for targeted volatile organic compounds.

9.0 **PREVENTIVE MAINTENANCE**

9.1 **FIELD FACILITY PREVENTIVE MAINTENANCE**

The analytical instrumentation will be maintained by the facility chemist. Preventive maintenance, as well as some major instrument repairs, can be accomplished on-site. A spare parts inventory in the field facility will allow for most on-site repairs. The field facility also maintains 24-hour service agreements with the instrument manufacturers to further assure the constant operation of the units.

The operational condition of instruments is one of the keys to successful completion of analytical tasks. Therefore, the facility chemist will assess, with assistance of instrumentation service experts, the need for on-site repair or if servicing is necessary. In the event of a catastrophic instrument failure, a complete assessment of the potential duration of downtime will be made within 24 hours. If this downtime estimate suggests that the sample holding times for laboratory analysis may be compromised, project management will be immediately notified by the Facility Task Manager.

All servicing and maintenance performed on the instruments are recorded and filed in an instrument specific maintenance log. This will provide an on-going historical record of the date, time and the type repair performed. Similar records are maintained for preventive maintenance activities. Procedure manuals outlining the proper use of each instrument are located in the on-site trailer and include instructions for use, calibration and maintenance of the instruments.

In the event of a catastrophic failure which would prevent the field facility from analyzing samples within the required 48-hour turnaround time, the Chief Field Chemist and Facility Task Coordinator will make arrangements with a USASE validated offsite laboratory for the samples to be analyzed for Volatile Organic Compounds by Method 8260 on a 96-hour turnaround basis.

10.0 SPECIFIC ROUTINE PROCEDURES USED TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

10.1 OVERALL PROJECT ASSESSMENT

Overall data quality will be assessed by a thorough understanding of the data quality objectives which are stated during the design phase of the investigation. By maintaining thorough documentation, ERM-FAST will closely monitor data precision, accuracy and completeness.

10.2 FIELD QUALITY ASSESSMENT

To ensure that all field data are collected accurately and correctly, specific written instructions will be issued to all personnel involved in field data acquisition by the Project Manager. The ERM Technical Manager will perform field audits during the initial sampling events of the investigation to document that the appropriate procedures are being followed for GC screening and GC/MS analysis. These audits will include a thorough review of the instrument log books, QC summaries, initial and continuing calibration data, raw sample data and data deliverables to ensure that all tasks were performed as specified in this QAP. The field audits will necessarily enable the data quality to be assessed at the outset of operation of the field analytical facility.

The evaluation (data review) of field blanks and other field QC samples will provide definitive indications of the data quality. If a problem arises which can be isolated, corrective actions will be instituted.

10.3 FIELD FACILITY DATA QUALITY ASSESSMENT

Overall data quality for the results generated by the field facility will include "real-time" review during data acquisition and will be performed daily by the facility chemist. The "real-time" review will consist of verifying that mass calibrations are acceptable, that correct quantitation response factors and dilution factors are used, that all sample mass spectra indicate correct compound identification, that internal quality control checks are performed at the required frequencies, and that data quality objectives are met. This evaluation will require performing all QA

evaluation (blanks, standards, and internal/surrogate standard recoveries) in time to allow corrective action and reanalysis, where required, within the stipulated holding times and to meet project schedules.

The following is a discussion of the precision and accuracy criteria used in the "real-time" review of analytical data, as well as representativeness. Specific values for the quantities expressed below can be found in Table 3-2 and Table 3-3 of Section 3 (calibrations, duplicates, blanks, matrix spike recoveries, surrogate standard recoveries, internal standard responses). The most recent revision of "Laboratory Data Validation Functional Guidelines for the Evaluation of Organic Analysis" with EPA Region III modifications will be used as general guidance for "real-time" data review. All data qualifying codes will be consistent with this guidance. All data generated will be subject to "real-time" review.

10.3.1 *Precision*

The facility objective for precision is to equal or exceed the precision demonstrated by the duplicate analyses of a representative matrix during analytical method development. The quantity used in the evaluation of precision is Relative Percent Difference (RPD), which is defined by the following equation:

$$RPD = \{ |R1 - R2| / [(R1 + R2) / 2] \} \times 100$$

Where:

R1 = result of sample analysis

R2 = result of duplicate sample analysis

10.3.2 *Accuracy*

The facility objective for accuracy is to equal or exceed the analyte recovery demonstrated for the analysis of a fortified representative matrix during analytical method development. The quantity used in the evaluation of analytical accuracy is Percent Recovery (%R), which is defined by the following equation:

$$\%R = [(Conc. Analyte Meas.) / (Conc. of Analyte Added)] \times 100$$

10.3.3 *Representativeness*

The representativeness of an analytical sample aliquot depends on the constitution of the sample itself, and the resulting matrix after sample

preparation. The objective for representativeness to provide data of the same quality for all samples of the same matrix type. A gauge of representativeness is offered through the calculated RPD for "blind" duplicate sample analysis. The calculation of RPD for estimates of representativeness is the same as that stated for precision above.

10.3.4

Methods for Attainment of Quality Control Objectives

The facility quality control (QC) objectives shall be attained through the use of specific samples and procedures. This shall address the qualities of sample preparation, instrumental procedures and other analytical protocols within the field facility. The particular types and frequencies of QC samples processed and analyzed can be found in Section 8.1 of this QAP. Blind duplicate samples will be routinely submitted to the field facility by the field sampling team (directed by the Project Manager). Matrix fortified samples shall consist of a matrix from the site which has been spiked with known concentrations of volatile and semivolatile organic compounds from appropriate, traceable standard mixes. Surrogate standard compounds shall be spiked into all samples prior to GC/MS analysis to gauge the extraction efficiency of the purge and trap procedure on a sample-specific basis. Internal standard compounds shall be added to all samples prior to GC/MS analysis to monitor system performance as it pertains to the consistent relative responses of targeted volatile organic compounds and associated internal standards. The data reported for these samples shall be evaluated in the post-analysis data review phase of the project. These results will then serve to determine an overall project precision and accuracy rating for field facility.

10.4

FIELD FACILITY POST-ANALYSIS REVIEW

A detailed data review shall be performed by the ERM-FAST Quality Assurance Chemist to verify the qualitative and quantitative reliability of the data as it is presented. This review shall include a review and interpretation of 20% of the data generated by field facility. The primary tools which may be used by experienced data review chemists are guidance documents, established (contractual) criteria, and professional judgment. Items examined by the Data Quality Assessment include field and method blanks, continuing calibration check standards, matrix fortified recoveries, surrogate standard recoveries, internal standard responses, overall instrument performance and sensitivity, and blind duplicate analyses.

For the purpose of ensuring data usability, all field generated data shall undergo an appropriate level of review. As stated previously, all data shall undergo on-site review at the time of generation (Section 10.3). In addition 20% of all data shall undergo post-analysis review by the procedures stated in Section 10.3 and on the basis of the deliverables (support Documentation) cited in Section 7.0. Ten percent (10%) of the GC/MS data generated during the project will be validated as described in Section 12.4.1 of the Quality Assurance Project Plan (QAPP).

If the nature of the results allow, half of the samples selected for post-analysis review shall have associated positive results and half shall have no detections. This offers the most uniform sampling of data for an overall field facility efficiency rating.

Based upon the review of the analytical data, support documentation will be prepared and filed with the project which will record the qualitative and quantitative reliability of the analytical data. The record will consist of general and specific comments and qualifying statements that should be taken into consideration for the analytical results to best be utilized. Based upon the data review, qualifier codes will be placed next to specific sample results on the field deliverable forms. Detected sample results which are less than the compound quantitation limit will be reported with a "J" qualifier next to the quantitative value on the Level III field deliverable forms. This and other qualifier codes serve as an indication of the qualitative and quantitative reliability of the data. The support documentation package will provide the backup information that will accompany all qualifying statements pertaining to the data.

10.5

DATA MANAGEMENT QUALITY ASSESSMENT

As the analytical data generated from the subject investigation are reviewed, qualified, and submitted to the Project Manager, the quality of the data will be assessed from an overall management perspective by direct comparison of analytical results obtained from previous samplings. Information that can be obtained includes comparison of results obtained from samples taken within the same general vicinity, and the identification of missing data points. By examination of the data at the "back-end" of the process, the data quality can be assessed with respect to representativeness, precision, compatibility, and completeness.

Attachment 1
ERM-FAST® Staff Qualifications and Experience
Summaries

AR303298

ERM-FAST® STAFF QUALIFICATIONS AND EXPERIENCE SUMMARIES

ERM-FAST® staff consists of chemists, environmental scientists, field technicians, and a facility schedule coordinator. One staff member holds a doctorate degree, several staff members hold bachelor of science degrees and one staff member holds an associate degree. Education and experience summaries are presented below for each staff member:

DAVID E. GALLIS, PH.D

QUALITY ASSURANCE DIRECTOR AND ERM-FAST® TECHNICAL DIRECTOR

Education:

Georgetown University, Ph.D. Physical Organic Chemistry, 1987.

West Chester University, B.S. Chemistry (A.C.S.), 1981.

Continuing Education:

"Two-Dimensional NMR Short Course," R. Bible and L. F. Johnson, sponsored by the American Chemical Society, Chicago, IL, 1985.

"MS/MS Short Course," R. G. Cooks, Purdue University, West Lafayette, IN, 1984.

Experience:

As facility Technical Project Manager, Dr. Gallis manages all technical aspects of the design, implementation, continuing development and operational oversight of the field screening unit GC/MS and XRF instrumentation, standard operating procedures and staff. This includes management and training of a staff of three field chemists and one chemistry technician.

Dr. Gallis is responsible for facility-generated data quality review on a project by project basis. He is also the primary client liason with respect to facility operational issues regarding field screening in the project scope as it pertains to regulatory acceptance. Dr. Gallis also provides expert legal representation on analytical issues.

Dr. Gallis also currently performs data validation oversight and serves as technical expert for non-routine analytical issues. Dr. Gallis specializes in

technical data review and validation of routine and special analytical protocols. Dr. Gallis has a published background in mass spectrometric techniques, absorption spectroscopies, chromatographic sciences, and chemical kinetics.

In his current capacity with ERM, Inc., Dr. Gallis is intimately familiar with SW-846, CLP, 500 series drinking water analysis, and 600 series water analysis protocols, as well as the national, EPA region specific, and state specific data validation guidelines for their review. Dr. Gallis is ERM's resident expert in PCB, dioxin/furan and air analysis.

To date, Dr. Gallis has directly reviewed or has overseen in excess of 100 data validation and review events of environmental analyses. Dr. Gallis is quite familiar with deliverables formats and requirements such as CLP, RCRA, New Jersey Tier I and II, New Jersey ECRA Tier I and II, New York State formats, Pennsylvania Report Forms, and NPDES formats. Dr. Gallis has also authored 8 QAPjPs for work at CERCLA sites and RCRA facilities in Pennsylvania, New Jersey, West Virginia, and Puerto Rico, including the first QAPjP for an RFI that was unconditionally accepted by EPA Region III.

Prior to his employment at ERM, Dr. Gallis was the Organic Group Manager of the EPA Region III, Environmental Services Assistance Team (ESAT) provided under contract by Roy F. Weston, Inc.. This group provided all data validation services for EPA Region III CERCLA investigations and Special Analytical Services (SAS). This amounted to more than 40 Superfund investigations. During this employment period, Dr. Gallis was also responsible for QAPjP review and development of SAS request specifications.

Publications:

"Acyclic α -Alkoxynitrones. A New Class of Spin-Trapping Agents," *Journal of Organic Chemistry*, 54, 1743-1745 (1989)

" α -Heteroatom-Substituted Nitrones. Synthesis and Reactions of Acyclic α -Alkoxynitrones," *Journal of Organic Chemistry*, 54, 1736-1743 (1989)

"Use of NOE Difference Spectra to Determine Configurations and Conformations of Imidate Esters," *Magnetic Resonance in Chemistry*, 25, 480-483 (1987)

"Alkoxyoxaziridines. Stereochemical Aspects of Imidate Oxidation, and Asymmetric Synthesis, and Unusually Facile E-Z Isomerization," Journal of Organic Chemistry, 51, 3266-3270 (1986)

"Optimization of a Reversed Phase Partitioning Technique for the Analysis of Polychlorinated Biphenyls in Aqueous Samples by Gas Chromatography/Mass spectrometry," Bull. Environ. Contam. Toxicol., 31, 285-291 (1983)

"The Recovery of Organic Solvents from Liquid Scintillation Waste," American Laboratory, February (1983)

"Separation and Analysis of Citral Isomers," Journal of Chemical Education, 60, 434-436 (1983)

"Phenylbutazone Kinetics and Metabolism in the Horse after Five Days of Administration," American Journal of Veterinary Research, 44(11), 2104-2109 (1983)

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SHAWNE M. RODGERS
QUALITY ASSURANCE MANAGER

Education:

B.S., Chemistry, University of Pittsburgh, 1986.

Experience:

Ms. Rodgers currently serves as ERM's primary contact for client and regulatory agency related issues for projects involving laboratory analytical services. This includes budget preparation for project analytical costs, QAPjP document preparation, training and managing a staff of Quality Assurance Chemists, and interfacing with analytical laboratories. She performs data validation oversight and is responsible for overseeing quality assurance activities for several CERCLA and RCRA investigation activities.

In her current capacity, Ms. Rodgers is intimately familiar with SW-846, CLP, 500 series drinking water analysis, and 600 series analysis protocols, as well as the national, EPA region-specific, and state-specific data validation guidelines for their review. To date, Ms. Rodgers has directly reviewed or has overseen in excess of 100 data validation and review elements of environmental analyses. Ms. Rodgers is quite familiar with CLP, RCRA, New Jersey Tiers I and II, New Jersey ECRA Tiers I and II, New York State, and NPDES deliverable formats and requirements. Ms. Rodgers has also authored twelve QAPjPs for CERCLA sites and RCRA facilities in Pennsylvania, Maryland, Connecticut, Delaware, and for a risk assessment investigation performed in Europe.

Prior to her employment with ERM, Ms. Rodgers was a QAPP Chemist with the EPA Region I Environmental Services Assistance Team (ESAT). This group provided data validation services for EPA Region I CERCLA investigations and provided oversight of Region I contractors. During this employment, Ms. Rodgers was responsible for QAPjP review, development of Special Analytical Services (SAS) specifications, and oversight of Region I contractor SAS requests. Additionally, she was responsible for the development and implementation of data validation training workshops.

Ms. Rodgers also worked for several years at an environmental analytical laboratory. She has extensive practical experience performing inorganic

analyses. She also served as a quality assurance officer for the laboratory and was responsible for the development and implementation of the laboratory's in-house quality assurance/quality control program.

DAVID R. CATHERMAN

ERM-FAST® TECHNICAL PROJECT MANAGER

Education

M.S. candidate, Chemistry, Saint Joseph's University

B.S. Environmental Science/Ecology, Johnson State College

Certified as having met OSHA Hazardous Waste Requirements under 29 CFR 1910.120. Updated annually.

Experience

Primary responsibilities include technical operation and management of Field Analytical Services Technology (ERM-FAST®) unit and staff. He is responsible for the uniform operation and maintenance of the field screening unit including its various self-contained power states, laboratory-grade instrumentation (GC/MS and EDXRF) and all standard operating procedures pertaining to field screening activities. He has performed numerous on-site analyses for organics and inorganics to provide field screening data for a variety of RCRA and CERCLA projects.

Mr. Catherman is also responsible for QA/QC implementation, oversight and review of all field screening activities including field personnel (chemists and technicians), and the data generated from GC/MS and EDXRF on-site analyses using the ERM-FAST® mobile screening unit.

Prior to his employment at ERM, Inc., Mr. Catherman was employed for seven years as an HPLC and GC/MS operator for an independent toxicology laboratory specializing in the analysis of biological fluids for controlled substances and therapeutic drugs.

CHERI PEARSON

**ERM-FAST® CHIEF FIELD CHEMIST AND QUALITY ASSURANCE
CHEMIST**

Education

B.S., Biology, Mount Saint Mary's College, 1989.

Certified as having met OSHA Hazardous Waste Requirements under 29 CFR 1910.120, updated annually.

Experience

Responsibilities include the operation and maintenance of analytical equipment used to perform numerous on-site GC/MS and XRF analyses for organic and inorganic constituents in both aqueous and solid media. This field screening data has been provided for a variety of RCRA and CERCLA projects. She has also been involved in the implementation of QA/QC procedures and review of the field screening data generated during the operation of the FAST mobile screening unit. Other responsibilities include analytical techniques for instrumental and sample preparation method development.

Prior to her employment at ERM, Ms. Pearson was employed as an Environmental Laboratory Technician III by the Delaware Department of Natural Resources and Environmental Control. In her position at the DNREC's lab, a CLP-certified environmental testing laboratory, she performed numerous procedures utilizing EPA methodologies for organic analysis of solid, aqueous and air media by GC/MS including associated QA/QC review and data deliverables compilation.

WILLIAM GOLDSCHMIDT
ERM-FAST® FACILITY TASK MANAGER

Education:

West Chester University, B.A. Geography and Planning, 1980.

Continuing Education:

Hazardous Materials Response Operations, Remedial Response Health and Safety Training Course, 1986, Roy F. Weston, Inc.

Pennsylvania Right To Know Training Seminar, 1988, Pennsylvania Department of Labor and Industry.

Basic Principles of G.C. (Packed Column Chromatography), 1988, Supelco, Inc. Short Course.

Principals of Capillary Column Gas Chromatography, 1988, Supelco, Inc. Short Course.

Theory and Application of Vadose Zone Monitoring & Sampling Techniques, 1989, The Association of Ground Water Scientists and Engineers (A Division of the National Well Water Association) Dr. L. G. Everett and Dr. D. K. Kreamer.

Analytical Techniques for Portable Gas Chromatography, 1990, Sentex Sensing Technology, Inc.

Portable Gas Chromatography Training Course, 1990, Eastern Connecticut State University, Dr. T. M. Spittler.

Analytical Techniques of PCB Analysis, 1991, Sentex Sensing Technology, Inc.

Technical Writting, 1992, Shipley Associates.

Experience:

Mr. Goldschmidt serves as the ERM-FAST® Facility Task Manager. His responsibilities include the coordination of facility usage schedules and

serving as a communications link between the facility personnel on-site and the facility Technical Project Manager and Quality Assurance Manager at the facility base of operations (ERM, Inc., Exton, PA).

Mr. William L. Goldschmidt also has over nine years of diversified experience as a professional in the environmental field both within the regulatory and private sectors. He is presently project manager with ERM-FAST® overseeing a staff of trained GC, GC/MS, and XRF chemists/operators. Mr. Goldschmidt has designed and implemented various field screening methods, including soil headspace and soil gas survey techniques employing gas chromatography. He has extensive experience in the application of portable gas chromatography in various field investigations at CERCLA, RCRA, and other industrial sites throughout the United States.

SUEELLEN DOTY

ERM-FAST® FIELD TECHNICIAN

Education

A.A.S., Ecology and Environmental Technology, Paul Smith's College, 1990.

Certified as having met OSHA Hazardous Waste Requirements under 29 CFR 1910.120. Updated annually.

Experience

Primary responsibilities include sample preparation of soil and aqueous media for field analysis of organics and inorganics by GC/MS and XRF, respectively. She has performed numerous on-site sample preparations for field screening techniques for the generation of data to be used for a variety of RCRA and CERCLA projects. She is responsible for the inventory and stocking of reagents, analytical standards and sample preparation supplies used in field screening protocols with the ERM-FAST® mobile unit. She continually updates material safety data sheets, state XRF registrations and procures project health and safety plans.

Additionally, she is familiar with acquiring mass spectral information and performing search routines (using the NIST 50,000 Mass Spectra database) for use by QA chemists in evaluating TICs.

Ms. Doty has tabulated field sampling data for several CERCLA site and RCRA facility investigations. She is experienced in evaluating numerous analysis report formats, including CLP Form Is for entry of analytical data and sample information into spreadsheet software and ERM's EIS database. She also reviews laboratory data deliverables for adherence to chain of custody documentation and traffic report sample information. Ms. Doty is the primary data entry technician responsible for the upload of analytical data and field data into ERM's EIS database system and has a working knowledge of Lotus 123, Microsoft Excel and Microsoft Word software.

MICHAEL OSTERHAUDT

**ERM-FAST® CHIEF FIELD CHEMIST AND QUALITY ASSURANCE
CHEMIST**

Education

B.S., Biology, St. Bonaventure University, 1992.

Experience

Responsibilities include the operation and maintenance of analytical equipment used to perform numerous on-site GC/MS and XRF analyses for organic and inorganic constituents in both aqueous and solid media. This field screening data has been provided for a variety of RCRA and CERCLA projects. He has also been involved in the implementation of QA/QC procedures and review of the field screening data generated during the operation of the FAST mobile screening unit. Other responsibilities include analytical techniques for instrumental and sample preparation method development.

Attachment 2
ERM-FAST® Standard Operating Procedures

AR303308

*Site Specific Volatile and
Semivolatile Organic Compounds
in Headspace by Gas
Chromatography Screen*

AR303309

**STANDARD OPERATING PROCEDURE FOR VOLATILE AND
SELECTED SEMIVOLATILE ORGANIC COMPOUNDS IN HEADSPACE
ANALYZED BY GAS CHROMATOGRAPHY**

1.0 INTRODUCTION

1.1 Scope and Application

1.1.1 This Standard Operating Procedure (SOP) is designed to describe in detail the field screening method and procedures for volatile organic (VOC) and selected semivolatile organic compounds (SVOCs) in water, soil, and soil vapor matrices using a Gas Chromatograph (GC). The methods and procedures included in this SOP have been developed and field tested by ERM-FAST® (Environmental Resources Management, Inc. [ERM], Exton, Pennsylvania, Field Analytical Services Technology [FAST]).

1.2 Field Screening Overview

1.2.1 This GC field screening procedure is applicable to the determination of the following site specific volatile and semivolatile organic compounds: tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), 1,2-dichloroethane (1,2-DCA), carbon tetrachloride, chlorobenzene, 1,2-, 1,3-, and 1,4-dichlorobenzenes, vinyl chloride, benzene, toluene, ethyl benzene and o-, m-, and p-xylene.

1.2.2 The organic compounds and quantitation limits screened by ERM-FAST are listed in Table 6-1 and Table 6-2 of the ERM-FAST® QAP.

1.2.3 Quantitation of organic compounds is performed by an external standardization method as described in Section 8 of this SOP. Integration of peak area or measurement of peak height is processed by the data handling software.

1.3 Qualifications

1.3.1 The methods and procedures included in this SOP are intended to provide a level of data quality that is consistent with its level of usability. These methods and procedures are intended for use in the field and, as such, contain quality control measures that best account for the inherent variability in field sampling and field screening. This SOP is intended to

direct the gathering of screening-level data only, and such data generated in the field should not be used above its intended level of usability.

- 1.3.2 The quantitation limits for a specific sample may differ from those listed in Table 6-1 and Table 6-2 depending upon sample dilution and/or interferences in (and the nature of) the sample matrix. The quantitation limits are based on sample wet weight and may be different based on dry-weight correction.
- 1.3.3 The methods are restricted to use by or under the supervision of analysts experienced in the use of gas chromatography (GC) instrumentation, and skilled in the interpretation of the data generated by the GC. Each analyst must demonstrate the ability to generate acceptable results with this method using the procedures described in Section 6.

2.0 SUMMARY OF METHODS

2.1 Screening Method 1: Aqueous Samples.

Water samples will be prepared for screening by placing approximately 20 milliliters of water from the sample collection vial into a tared 40 milliliter screw cap vial with a Teflon-lined septum. The extraction vessel will then be shaken vigorously for one minute to aid in forcing the VOCs into the headspace of the vessel. The prepared sample will then be heated to 40°C in a laboratory-grade oven for 5 minutes. After equilibration, an aliquot of headspace is directly injected into the packed injection port on the GC then swept into a capillary GC column. The GC is temperature programmed to separate the organic compounds which are then detected with a photoionization detector and an electrolytic conductivity detector.

2.2 Screening Method 2: Soil Samples.

Soil samples will be prepared for analysis by placing approximately 10 grams of soil (from the sample collection vial) into a tared 40 milliliter screw cap vial with a Teflon-lined septum which contains 15 milliliters of organic free water. The extraction vessel will then be processed and the aliquot will be taken through the steps described in Section 2.1.

2.3 Screening Method 3: Soil Vapor Samples.

Soil vapor samples to be screened on the GC will be collected from the field sampling location directly into 1 liter Tedlar bags with Teflon-lined septa. A fifty microliter (50 µL) or an appropriate aliquot of soil vapor sample from the bag will be withdrawn through the Teflon septum with a Hamilton gas tight syringe, and injected into the calibrated GC. The GC is temperature programmed to separate the organic compounds which are then detected with a photoionization detector and an electrolytic conductivity detector.

3.0

INTERFERENCES

Contamination by carryover can occur whenever high-level and low-level samples are sequentially analyzed. To reduce carryover, the sample syringe will be pumped repetitively and heated to 40°C in a laboratory-grade oven between samples. Whenever an unusually concentrated sample is encountered, it will be followed by an analysis of a method blank to check for cross contamination. Repeated analyses of method blank samples will be performed until contamination is no longer observed.

Samples can be contaminated by diffusion of volatile organics (particularly methylene chloride) through the sample container septum during shipment and storage. A field sample blank prepared from reagent water and carried through sampling and subsequent storage and handling can serve as a check on such contamination.

4.0 APPARATUS AND MATERIALS

4.1 Gas Chromatograph

The Gas Chromatograph (GC) is equipped with dual detectors, an electrolytic conductivity detector (ELCD) and a photoionization detector (PID) for analysis of organic compounds. The ELCD (often referred to as the Hall detector) is halogen specific. The GC column effluent is mixed with hydrogen and passed through a heated nickel reactor tube where the halogen is reduced forming an acid (HCl, HBr, HI or HF). The acid is absorbed in n-propanol. The increased conductivity of the acid in n-propanol is measured and the signal is proportional to the amount of converted halogen. The PID is designed to allow the effluent to be ionized by ultraviolet light (provided the ionization potential of the effluent is less than that of the UV source). The current produced by the ion flow is measured by the detector and is proportional to the concentration of the ionized material.

4.2 The GC is controlled by an external personal computer (PC) microprocessor and the data acquisition software. The GC obtains its instructions from configuration and operating parameters which are entered from the PC keyboard. The data acquisition software is a hardware and software system developed to perform the following tasks:

- control supported chromatographs through serial communications
- acquire dialog or digital chromatography data from chromatograms
- analyze the raw data and report results
- automatically control the acquisition and analysis of data from large batches of samples
- store the raw data and calculated results
- create methods that define acquisition and analysis parameters
- optimize analysis parameters through graphics and use the improved parameters to reprocess raw data
- use graphics applications to compare chromatograms
- communicate with other software applications, such as Microsoft® Excel.

The GC unit and computer instrumentation will be housed in a mobile analytical facility on-site. The facility will be climatically controlled by heating and air conditioning units to maintain a stable temperature for proper performance of all instrumentation.

4.3 *Silica Capillary Column*

The fused silica capillary column is manufactured by Supelco, Inc. and is a VOCOL 30 m x 0.53 mm i.d. with 3 μ m film thickness. The column temperature range is -60°C to 300°C.

4.4 *Sample Introduction Apparatus*

The sample introduction apparatus consists of:

- 250 μ l, gas-tight Hamilton (1725N) syringe
- 10-, 50 μ l, fixed SS needle Hamilton (701N, 705N) syringe
- 40 ml, Teflon lined screw capped vials

5.0 REAGENTS

5.1 Reagent Water

The reagent water is defined as water in which an interferent is not observed at the method detection limit (MDL) of the parameters of interest.

5.2 Methanol

HPLC grade or equivalent.

5.3 Stock Standard Solution

The stock standard is a custom standard mix of the compounds of interest which was prepared by Supelco, Inc. The standard mix contains each of the seventeen compounds at the concentration value of 100 parts per million [micrograms per milliliter ($\mu\text{g}/\text{ml}$)] in a methanol solution. Each compound in the standard solution was quantitatively and gravimetrically evaluated by Supelco, Inc. to meet internal quality acceptance criteria.

5.3.1 Calibration Standards for Soil and Water Matrices

Calibration standards, prepared from the stock standard, at three concentration levels [10, 50, 200 parts per billion [micrograms per liter ($\mu\text{g}/\text{L}$)] are prepared in reagent water in the 40-milliliter vials. The low standard concentration is near and above the method detection limit. The remaining concentration levels correspond to the expected range of concentrations to be found in most real samples. Each standard contains all targeted analytes for detection by this method.

5.3.1.1 Calibration Standards for Soil Vapor Matrices

Calibration standards, prepared from the neat standard, at three concentration levels [1, 5, 10 parts per million [micrograms per liter air ($\mu\text{g}/\text{L}_{\text{air}}$)] are prepared in Tedlar® bags. The mid level standard concentration is near and above the method detection limit. The mid and high level standard concentrations correspond to the expected range of concentrations to be found in most real samples. Each standard contains all targeted analytes for detection by this method.

5.3.2 Matrix Spike

The matrix spike (soil and water matrices only) will monitor both the performance of the analytical system and the effectiveness of the method in dealing with each sample matrix. Each representative spike will consist of all of the seventeen targeted analytes at a concentration level of 100 $\mu\text{g/Kg}$. The spike level is higher than mid-range but not above the calibration range.

6.0 PROCEDURE

6.1 Standard Preparation

6.1.1 Standard Preparation for Soil and Water Matrices

A tared 40-milliliter screw cap vial with a Teflon-lined septum is filled with 20-milliliters of organic free water then spiked with the required volume of stock standard to obtain the working calibration standard [10, 50, 200 ppb ($\mu\text{g/L}$)]. The following formula is used to calculate the required volume:

$$V_s = \frac{20\text{ml} \cdot C_n}{100\text{mg}/\mu\text{l}}$$

Where:

V_s = volume of stock standard (ml)

C_n = desired concentration of volatile compound ($\text{mg}/\mu\text{l}$)

The standard vials are labeled with the correct concentration value, capped tightly, then shaken vigorously for one minute to aid in forcing the volatile compounds into the headspace. The standards are then placed into a laboratory-grade oven and heated at 40°C for five minutes to allow for equilibration of the headspace.

6.1.2 Standard Preparation for Soil Vapor Matrices

The GC will be calibrated to appropriate $\mu\text{g}/\text{L}_{\text{air}}$ levels of working standards for the volatile compounds of interest. Standards will be prepared by adding neat organic compound into 1-Liter Tedlar bags with a Teflon[®]-lined septum. The following formula will be used to calculate the required volume of stock standard to be added into the bag to obtain the working standard:

$$V_s = \frac{1 \text{ L}_{\text{air}} \cdot C_w}{\text{Density of Compound (g/mL)}}$$

Where:

V_s = volume of stock standard (μL)

C_w = desired concentration of volatile compound
($\mu\text{g/Lair}$)

6.2 *Standard Analysis*

After equilibration, a 200 μL (or appropriate) aliquot of the headspace is withdrawn from the standard vial by inserting a 1725N Hamilton syringe through the Teflon septum and just above the water line. The syringe with the aliquot is then directly injected into the packed injection port of the GC. The temperature program for the GC oven is set to equilibrate for 2 minutes at 40°C prior to run-ready mode. Once the run is initiated the oven will hold the 40°C temperature for two minutes then ramp to 190°C at a rate of 10° C/min. After 190°C temperature is reached a quick ramp rate of 45°C/min is set to 230°C to heat any remaining volatiles compounds. The carrier gas flow rate is a constant 10 ml/min.

6.3 *Retention Time Windows*

Retention time windows must be established for each compound of interest by making three injections of all single component standard mixtures. Calculate the standard deviation of the three absolute retention times for each single component standard. Plus or minus three times the standard deviation of the absolute retention times for each standard will be used to define the retention time window. Once retention time criteria is generated for each component in the standard mix, standard calibration can be initiated.

6.4 *Standardization*

Once analyzed, the raw data is processed by data handling software to determine integrated peak areas. The ratio of the peak response (in area counts) to the standard concentration (in ng/g), defined as the calibration factor (CF), can be calculated for each component at each standard concentration. The initial standardization is accepted when the calculated percent relative standard deviation (%RSD) of the calibration factors for soil and water matrices is within 30%, or when the calculated relative

percent difference (RPD) of the mid and high level calibration factors for soil vapor matrix is within 30%.

6.5

Continuing Calibration

The working calibration curve or initial calibration average calibration factor must be verified on each working day by the injection of one or more calibration standards. A midlevel standard must also be injected at intervals of every 20 injections and at the end of the analysis sequence. If the response for any analyte varies from the predicted response by more than a factor of 30 percent difference (%D), then inspect the GC system to determine the cause and perform whatever maintenance is necessary before recalibrating. If unsuccessful in analyzing a continuing calibration standard which meets the criteria, a new calibration curve must be prepared for that analyte. All samples that were injected after the continuing calibration standard exceeding the criteria must be reinjected.

$$\text{Percent Difference} = \frac{CF_1 - CF_2}{CF_1} = 100$$

Where:

CF₁ = average calibration factor from initial calibration

CF₂ = calibration factor from continuing calibration analysis

6.6

Daily Retention Times

Establish daily retention time windows for each analyte. Use an absolute retention time for each analyte as the midpoint of the window for that day. The daily retention time window equals the midpoint \pm three times the standard deviation determined during the initial component injections.

7.0 **SAMPLE ANALYSIS**

7.1 *Aqueous and Soil Sample Analysis*

All samples should be analyzed just after collection. The samples are prepared as described in Sections 2.1 and 2.2. If during the analysis of the sample headspace, the responses exceed the linear range of the system, then the sample must be re-prepared. To dilute a sample, add less of the sample matrix to more reagent water in the 40-ml vial. It is recommended that samples be diluted so that all peaks are on scale. Overlapping peaks are not always evident when peaks are off scale. Computer reproduction of chromatograms, manipulated to ensure all peaks are on scale over a 100-fold range, are acceptable if linearity is demonstrated. Peak height measurements will be recommended over peak area integrations when overlapping peaks cause errors in area integration.

7.2 *Soil Vapor Analysis*

All samples should be analyzed just after collection. The samples are prepared as described in Sections 2.3. If during the analysis of the sample headspace, the responses exceed the linear range of the system, then the sample must be re-screened. To re-screen a sample, inject half (50%) of the previous injection volume in an attempt to obtain all peaks on scale. Overlapping peaks are not always evident when peaks are off scale. Computer reproduction of chromatograms, manipulated to ensure all peaks are on scale over a 100-fold range, are acceptable if linearity is demonstrated. Peak height measurements will be recommended over peak area integrations when overlapping peaks cause errors in area integration.

8.0 QUANTITATIONS AND CALCULATIONS

8.1 AQUEOUS AND SOIL SAMPLES

The concentration of each analyte in the soil or water sample may be determined by calculating the amount of standard injected, from the peak response, using the calibration curve or calibration factor. The concentration of a specific analyte is calculated as follows:

Aqueous samples:

$$\text{Analyte Concentration } (\mu\text{g/L}) = \frac{[(A_x)(A)(V_t)(D)]}{[(A_s)(V_i)(V_s)]}$$

Where:

A_x = Response for the analyte in the sample, units may be in area or peak height

A = Concentration of standard injected, ng/g

V_t = Volume of total sample, μl

D = Dilution factor, if dilution was made on the sample prior to analysis. If no dilution was made, $D=1$, dimensionless

A_s = Response for the external standard, units same as for A_x

V_i = Volume of sample injected, μl

V_s = Volume of sample, mL

Nonaqueous samples:

$$\text{Concentration (ng/g)} = \frac{[(A_x)(A)(V_t)(D)]}{[(A_s)(V_i)(W)]}$$

Where:

W = Weight of sample, g. The wet weight is used in the calculation.

A_X , A_S , A , V_t , D , and V_i have the same definition as for aqueous samples.

8.2 SOIL VAPOR SAMPLES

Quantitation for site specific compounds in soil vapor samples will be calculated based on the compound-specific average calibration factors generated from the initial two-point calibrations (mid and high level standards). The following formula will be used to calculate sample concentrations:

$$C_u = \frac{A_u \cdot V_s}{CF \cdot V_u \cdot V}$$

Where:

C_u = Concentration of compound ($\mu\text{g}/\text{Lair}$)

A_u = Response area of compound in the sample

V_s = Injection volume of the standard (μl)

V_u = Injection volume of sample (μl)

V = Volume of sample analyzed (Lair)

CF = The average of the ratios of weight of compound in standards (μg) to the response areas of the compound in the standards

9.0 **QUALITY CONTROL PROGRAM**

9.1 *Quality Control Program*

Each analyst that uses this method is required to operate a formal quality control program. The minimum requirements of this program consist of an initial demonstration of the instrument system capability (system response) and the quantitative analysis of a spiked sample (performance check). The analyst is required to maintain performance records to define the quality of data that are generated. On-going performance checks must be compared with established performance criteria to determine if the results of current analyses are within the accuracy and precision limits expected of the method.

9.1.1 Before performing any analyses, the analyst must demonstrate the ability to generate acceptable accuracy and precision with these methods.

9.1.2 The analyst must adhere to the QA/QC procedures described in the project-specific ERM-FAST® Quality Assurance Plan (QAP). These procedures pertain to the generation and evaluation of blank, response factor, initial standardization and continuing calibration check data.

9.2 *Quality Assurance Practices*

It is recommended for on-site measurements that quality assurance practices be consistent with data quality objectives. The specific practices will depend upon the requirements of the study objectives and on-site conditions. The applicable QA/QC analyses will be performed at the frequencies required in Section 8.0 of the ERM-FAST QAP.

9.3 *Qualifier*

Data generated in the field are subject to interferences from sample matrix components, changing atmospheric conditions and the use of non-conventional power sources. As such, it is recommended that data generated from any analyses conducted in the field not be utilized outside its level of usability.

*Target Compound List Volatile
Organic Compounds in Soil by
Gas Chromatography/Mass
Spectrometry Analysis*

AR303325

METHOD 8260A

VOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS):
CAPILLARY COLUMN TECHNIQUE

1.0 SCOPE AND APPLICATION

1.1 Method 8260 is used to determine volatile organic compounds in a variety of solid waste matrices. This method is applicable to nearly all types of samples, regardless of water content, including ground water, aqueous sludges, caustic liquors, acid liquors, waste solvents, oily wastes, mousses, tars, fibrous wastes, polymeric emulsions, filter cakes, spent carbons, spent catalysts, soils, and sediments. The following compounds can be determined by this method:

Analyte	CAS No. ^b	<u>Appropriate Technique</u>	
		Purge-and-Trap	Direct Injection
Acetone	67-64-1	pp	a
Benzene	71-43-2	a	a
Bromochloromethane (I.S.)	74-97-5	a	a
Bromodichloromethane	75-27-4	a	a
4-Bromofluorobenzene (surr.)	460-00-4	a	a
Bromoform	75-25-2	a	a
Bromomethane	74-83-9	a	a
2-Butanone (MEK)	78-93-3	pp	a
Carbon disulfide	75-15-0	pp	a
Carbon tetrachloride	56-23-5	a	a
Chlorobenzene	108-90-7	a	a
Chlorodibromomethane	124-48-1	a	a
Chloroethane	75-00-3	a	a
2-Chloroethyl vinyl ether	110-75-8	a	a
Chloroform	67-66-3	a	a
Chloromethane	74-87-3	a	a

Analyte	<u>Appropriate Technique</u>		Direct Injection
	CAS No. ^b	Purge-and-Trap	
1,1-Dichloroethane	75-34-3	a	a
1,2-Dichloroethane	107-06-2	a	a
1,1-Dichloroethene	75-35-4	a	a
trans-1,2-Dichloroethene	156-60-5	a	a
1,2-Dichloropropane	78-87-5	a	a
cis-1,3-Dichloropropene	10061-01-5	a	a
trans-1,3-Dichloropropene	10061-02-6	a	a
1,4-Difluorobenzene (I.S.)	540-36-3	a	a
2-Hexanone	591-78-6	pp	a
Methylene chloride	75-09-2	a	a
4-Methyl-2-pentanone (MIBK)	108-10-1	pp	a

Analyte	Appropriate Technique		Direct Injection
	CAS No. ^b	Purge-and-Trap	
Styrene	100-42-5	a	a
1,1,2,2-Tetrachloroethane	79-34-5	a	a
Tetrachloroethene	127-18-4	a	a
Toluene	108-88-3	a	a
1,1,1-Trichloroethane	71-55-6	a	a
1,1,2-Trichloroethane	79-00-5	a	a
Trichloroethene	79-01-6	a	a
Trichlorofluoromethane	75-69-4	a	a
Vinyl acetate	108-05-4	a	a
Vinyl chloride	75-01-4	a	a
o-Xylene	95-47-6	a	a
m-Xylene	108-38-3	a	a
p-Xylene	106-42-3	a	a

- a Adequate response by this technique.
b Chemical Abstract Services Registry Number.
ht Method analyte only when purged at 80°C
i Inappropriate technique for this analyte.
pc Poor chromatographic behavior.
pp Poor purging efficiency resulting in high EQLs.

1.2 Method 8260 can be used to quantitate most volatile organic compounds that have boiling points below 200°C and that are insoluble or slightly soluble in water. Volatile water-soluble compounds can be included in this analytical technique. However, for the more soluble compounds, quantitation limits are approximately ten times higher because of poor purging efficiency. Such compounds include low-molecular-weight halogenated hydrocarbons, aromatics, ketones, nitriles, acetates, acrylates, ethers, and sulfides. See Tables 1 and 2 for lists of analytes and retention times that have been evaluated on a purge-and-trap GC/MS system. Also, the method detection limits for 25 mL sample volumes are presented. The following analytes are also amenable to analysis by Method 8260:

1.3 The estimated quantitation limit (EQL) of Method 8260 for an individual compound is somewhat instrument dependent. Using standard quadrupole instrumentation, limits should be approximately 5 $\mu\text{g/kg}$ (wet weight) for soil/sediment samples, 0.5 mg/kg (wet weight) for wastes, and 5 $\mu\text{g/L}$ for ground water (see Table 3). Somewhat lower limits may be achieved using an ion trap mass spectrometer or other instrumentation of improved design. No matter which instrument is used, EQLs will be proportionately higher for sample extracts and samples that require dilution or reduced sample size to avoid saturation of the detector.

1.4 Method 8260 is based upon a purge-and-trap, gas chromatographic/mass spectrometric (GC/MS) procedure. This method is restricted to use by, or under the supervision of, analysts experienced in the use of purge-and-trap systems and gas chromatograph/mass spectrometers, and skilled in the interpretation of mass spectra and their use as a quantitative tool.

1.5 An additional method for sample introduction is direct injection. This technique has been tested for the analysis of waste oil diluted with hexadecane 1:1 (vol/vol) and may have application for the analysis of some alcohols and aldehydes in aqueous samples.

2.0 SUMMARY OF METHOD

2.1 The volatile compounds are introduced into the gas chromatograph by the purge-and-trap method or by direct injection (in limited applications). Purged sample components are trapped in a tube containing suitable sorbent materials. When purging is complete, the sorbent tube is heated and backflushed with helium to desorb trapped sample components. The analytes are desorbed directly to a large bore capillary or cryofocussed on a capillary precolumn before being flash evaporated to a narrow bore capillary for analysis. The column is temperature programmed to separate the analytes which are then detected with a mass spectrometer (MS) interfaced to the gas chromatograph. Wide bore capillary columns require a jet separator, whereas narrow bore capillary columns can be directly interfaced to the ion source.

2.2 If the above sample introduction techniques are not applicable, a portion of the sample is dispersed in solvent to dissolve the volatile organic constituents. A portion of the solution is combined with organic-free reagent water in the purge chamber. It is then analyzed by purge-and-trap GC/MS following the normal water method.

2.3 Analytes eluted from the capillary column are introduced into the mass spectrometer via a jet separator or a direct connection. Identification of target analytes is accomplished by comparing their mass spectra with the electron

impact (or electron impact-like) spectra of authentic standards. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard with a five-point calibration curve.

2.4 The method includes specific calibration and quality control steps that replace the general requirements in Method 8000.

3.0. INTERFERENCES

3.1 Major contaminant sources are volatile materials in the laboratory and impurities in the inert purging gas and in the sorbent trap. The use of non-polytetrafluoroethylene (PTFE) thread sealants, plastic tubing, or flow controllers with rubber components should be avoided since such materials out-gas organic compounds which will be concentrated in the trap during the purge operation. Analyses of calibration and reagent blanks provide information about the presence of contaminants. When potential interfering peaks are noted in blanks, the analyst should change the purge gas source and regenerate the molecular sieve purge gas filter (Figure 1). Subtracting blank values from sample results is not permitted. If reporting values not corrected for blanks result in what the laboratory feels is a false positive for a sample, this should be fully explained in text accompanying the uncorrected data.

3.2 Interfering contamination may occur when a sample containing low concentrations of volatile organic compounds is analyzed immediately after a sample containing high concentrations of volatile organic compounds. The preventive technique is rinsing of the purging apparatus and sample syringes with two portions of organic-free reagent water between samples. After analysis of a sample containing high concentrations of volatile organic compounds, one or more calibration blanks should be analyzed to check for cross contamination. For samples containing large amounts of water soluble materials, suspended solids, high boiling compounds or high concentrations of compounds being determined, it may be necessary to wash the purging device with a soap solution, rinse it with organic-free reagent water, and then dry the purging device in an oven at 105°C. In extreme situations, the whole purge and trap device may require dismantling and cleaning. Screening of the samples prior to purge and trap GC/MS analysis is highly recommended to prevent contamination of the system. This is especially true for soil and waste samples. Screening may be accomplished with an automated headspace technique or by Method 3820 (Hexadecane Extraction and Screening of Purgeable Organics).

3.2.1 The low purging efficiency of many analytes from a 25 mL sample often results in significant concentrations remaining in the sample purge vessel after analysis. After removal of the analyzed sample aliquot and three rinses of the purge vessel with analyte free water, it is required that the empty vessel be subjected to a heated purge cycle prior to the analysis of another sample in the same purge vessel to reduce sample to sample carryover.

3.3 Special precautions must be taken to analyze for methylene chloride. The analytical and sample storage area should be isolated from all atmospheric sources of methylene chloride. Otherwise random background levels will result. Since methylene chloride will permeate through PTFE tubing, all gas chromatography carrier gas lines and purge gas plumbing should be constructed

from stainless steel or copper tubing. Laboratory clothing worn by the analyst should be clean since clothing previously exposed to methylene chloride fumes during liquid/liquid extraction procedures can contribute to sample contamination.

3.4 Samples can be contaminated by diffusion of volatile organics (particularly methylene chloride and fluorocarbons) through the septum seal into the sample during shipment and storage. A trip blank prepared from organic-free reagent water and carried through the sampling and handling protocol can serve as a check on such contamination.

3.5 Use of sensitive mass spectrometers to achieve lower detection level will increase the potential to detect laboratory contaminants as interferences.

3.6 Direct injection - Some contamination may be eliminated by baking out the column between analyses. Changing the injector liner will reduce the potential for cross-contamination. A portion of the analytical column may need to be removed in the case of extreme contamination. Use of direct injection will result in the need for more frequent instrument maintenance.

3.7 If hexadecane is added to samples or petroleum samples are analyzed, some chromatographic peaks will elute after the target analytes. The oven temperature program must include a post-analysis bake out period to ensure that semi-volatile hydrocarbons are volatilized.

4.0 APPARATUS AND MATERIALS

4.1 Purge-and-trap device - aqueous samples, described in Method 5030.

4.2 Purge-and-trap device - solid samples, described in Method 5030.

4.3 Injection port liners (HP catalogue #18740-80200, or equivalent) are modified for direct injection analysis by placing a 1-cm plug of pyrex wool approximately 50-60 mm down the length of the injection port towards the oven. An 0.53 mm id column is mounted 1 cm into the liner from the oven side of the injection port, according to manufacturer's specifications.



Figure 1 Modified Injector

4.4 Gas chromatography/mass spectrometer/data system

4.4.1 Gas chromatograph - An analytical system complete with a temperature-programmable gas chromatograph suitable for splitless injection or interface to purge-and-trap apparatus. The system includes all required accessories, including syringes, analytical columns, and

gases. The GC should be equipped with variable constant differential flow controllers so that the column flow rate will remain constant throughout desorption and temperature program operation. For some column configurations, the column oven must be cooled to $< 30^{\circ}\text{C}$, therefore, a subambient oven controller may be required. The capillary column should be directly coupled to the source.

4.4.1.1 Capillary precolumn interface when using cryogenic cooling - This device interfaces the purge and trap concentrator to the capillary gas chromatograph. The interface condenses the desorbed sample components and focuses them into a narrow band on an uncoated fused silica capillary precolumn. When the interface is flash heated, the sample is transferred to the analytical capillary column.

4.4.1.1.1 During the cryofocussing step, the temperature of the fused silica in the interface is maintained at -150°C under a stream of liquid nitrogen. After the desorption period, the interface must be capable of rapid heating to 250°C in 15 seconds or less to complete the transfer of analytes.

4.4.2 Gas chromatographic columns

4.4.2.1 Column 1 - 60 m x 0.75 mm ID capillary column coated with VOCOL (Supelco), $1.5\text{ }\mu\text{m}$ film thickness, or equivalent.

4.4.2.2 Column 2 - 30 - 75 m x 0.53 mm ID capillary column coated with DB-624 (J&W Scientific), Rt_x-502.2 (RESTEK), or VOCOL (Supelco), $3\text{ }\mu\text{m}$ film thickness, or equivalent.

4.4.2.3 Column 3 - 30 m x 0.25 - 0.32 mm ID capillary column coated with 95% dimethyl - 5% diphenyl polysiloxane (DB-5, Rt_x-5, SPB-5, or equivalent), $1\text{ }\mu\text{m}$ film thickness.

4.4.3 Mass spectrometer - Capable of scanning from 35 to 300 amu every 2 sec or less, using 70 volts (nominal) electron energy in the electron impact ionization mode. The mass spectrometer must be capable of producing a mass spectrum for p-Bromofluorobenzene (BFB) which meets all of the criteria in Table 4 when 5-50 ng of the GC/MS tuning standard (BFB) is injected through the GC. To ensure sufficient precision of mass spectral data, the desirable MS scan rate allows acquisition of at least five spectra while a sample component elutes from the GC.

4.4.3.1 The ion trap mass spectrometer may be used if it is capable of axial modulation to reduce ion-molecule reactions and can produce electron impact-like spectra that match those in the EPA/NIST Library. The mass spectrometer must be capable of producing a mass spectrum for BFB which meets all of the criteria in Table 3 when 5 or 50 ng are introduced.

4.4.4 GC/MS interface - Two alternatives are used to interface the GC to the mass spectrometer.

4.4.4.1 Direct coupling by inserting the column into the mass spectrometer is generally used for 0.25-0.32 mm id columns.

4.4.4.2 A separator including an all transfer line and glass enrichment device or split interface is used with an 0.53 mm column.

4.4.4.3 Any enrichment device or transfer line can be used if all of the performance specifications described in Section 8 (including acceptable calibration at 50 ng or less) can be achieved. GC-to-MS interfaces constructed entirely of glass or of glass-lined materials are recommended. Glass can be deactivated by silanizing with dichlorodimethylsilane.

4.4.5 Data system - A computer system that allows the continuous acquisition and storage on machine-readable media of all mass spectra obtained throughout the duration of the chromatographic program must be interfaced to the mass spectrometer. The computer must have software that allows searching any GC/MS data file for ions of a specified mass and plotting such ion abundances versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). Software must also be available that allows integrating the abundances in any EICP between specified time or scan-number limits. The most recent version of the EPA/NIST Mass Spectral Library should also be available.

4.5 Microsyringes - 10, 25, 100, 250, 500, and 1,000 μ L.

4.6 Syringe valve - Two-way, with Luer ends (three each), if applicable to the purging device.

4.7 Syringes - 5, 10, or 25 mL, gas-tight with shutoff valve.

4.8 Balance - Analytical, 0.0001 g, and top-loading, 0.1 g.

4.9 Glass scintillation vials - 20 mL, with Teflon lined screw-caps or glass culture tubes with Teflon lined screw-caps.

4.10 Vials - 2 mL, for GC autosampler.

4.11 Disposable pipets - Pasteur.

4.12 Volumetric flasks, Class A - 10 mL and 100 mL, with ground-glass stoppers.

4.13 Spatula - Stainless steel.

5.0 REAGENTS

5.1 Reagent grade inorganic chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all inorganic reagents shall conform to the specifications of the Committee on Analytical Reagents of the American

Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

5.3 Methanol, CH_3OH - Pesticide quality or equivalent, demonstrated to be free of analytes. Store apart from other solvents.

5.4 Reagent Hexadecane - Reagent hexadecane is defined as hexadecane in which interference is not observed at the method detection limit of compounds of interest.

5.4.1 In order to demonstrate that all interfering volatiles have been removed from the hexadecane, a direct injection blank must be analyzed.

5.5 Polyethylene glycol, $\text{H}(\text{OCH}_2\text{CH}_2)_n\text{OH}$ - Free of interferences at the detection limit of the target analytes.

5.6 Hydrochloric acid (1:1 v/v), HCl - Carefully add a measured volume of concentrated HCl to an equal volume of organic-free reagent water.

5.7 Stock solutions - Stock solutions may be prepared from pure standard materials or purchased as certified solutions. Prepare stock standard solutions in methanol, using assayed liquids or gases, as appropriate.

5.7.1 Place about 9.8 mL of methanol in a 10 mL tared ground-glass-stoppered volumetric flask. Allow the flask to stand, unstoppered, for about 10 minutes or until all alcohol-wetted surfaces have dried. Weigh the flask to the nearest 0.0001 g.

5.7.2 Add the assayed reference material, as described below.

5.7.2.1 Liquids - Using a 100 μL syringe, immediately add two or more drops of assayed reference material to the flask; then reweigh. The liquid must fall directly into the alcohol without contacting the neck of the flask.

5.7.2.2 Gases - To prepare standards for any compounds that boil below 30°C (e.g. bromomethane, chloroethane, chloromethane, or vinyl chloride), fill a 5 mL valved gas-tight syringe with the reference standard to the 5.0 mL mark. Lower the needle to 5 mm above the methanol meniscus. Slowly introduce the reference standard above the surface of the liquid. The heavy gas will rapidly dissolve in the methanol. Standards may also be prepared by using a lecture bottle equipped with a Hamilton Lecture Bottle Septum (#86600). Attach Teflon tubing to the side arm relief valve and direct a gentle stream of gas into the methanol meniscus.

5.7.3 Reweigh, dilute to volume, stopper, and then mix by inverting the flask several times. Calculate the concentration in milligrams per liter (mg/L) from the net gain in weight. When compound purity is assayed

to be 96% or greater, the weight may be used without correction to calculate the concentration of the stock standard. Commercially prepared stock standards may be used at any concentration if they are certified by the manufacturer or by an independent source.

5.7.4 Transfer the stock standard solution into a bottle with a Teflon lined screw-cap. Store, with minimal headspace, at -10°C to -20°C and protect from light.

5.7.5 Prepare fresh standards for gases weekly or sooner if comparison with check standards indicates a problem. Reactive compounds such as 2-chloroethyl vinyl ether and styrene may need to be prepared more frequently. All other standards must be replaced after two months, or sooner if comparison with check standards indicates a problem. Both gas and liquid standards must be monitored closely by comparison to the initial calibration curve and by comparison to QC check standards. It may be necessary to replace the standards more frequently if either check exceeds a 25% drift.

5.7.6 Optionally calibration using a certified gaseous mixture can be accomplished daily utilizing commercially available gaseous analyte mixture of bromomethane, chloromethane, chloroethane, vinyl chloride, dichlorodifluoromethane and trichlorofluoromethane in nitrogen. These mixtures of documented quality are stable for as long as six months without refrigeration. (VOA-CYL III, RESTEK Corporation, Cat. #20194 or equivalent).

5.7.6.1 Preparation of Calibration Standards From a Gas Mixture

5.7.6.1.1 Before removing the cylinder shipping cap, be sure the valve is completely closed (turn clockwise). The contents are under pressure and should be used in a well-ventilated area.

5.7.6.1.2 Wrap the pipe thread end of the Luer fitting with Teflon tape. Remove the shipping cap from the cylinder and replace it with the Luer fitting.

5.7.6.1.3 Transfer half the working standard containing other analytes, internal standards, and surrogates to the purge apparatus.

5.7.6.1.4 Purge the Luer fitting and stem on the gas cylinder prior to sample removal using the following sequence:

- a) Connect either the 100 μL or 500 μL Luer syringe to the inlet fitting of the cylinder.
- b) Make sure the on/off valve on the syringe is in the open position.
- c) Slowly open the valve on the cylinder and withdraw a full syringe volume.

- d) Be sure to close the valve on the cylinder before you withdraw the syringe from the Luer fitting.
- e) Expel the gas from the syringe into a well-ventilated area.
- f) Repeat steps a through e one more time to fully purge the fitting.

5.7.6.1.5 Once the fitting and stem have been purged, quickly withdraw the volume of gas you require using steps 5.6.6.1.4(a) through (d). Be sure to close the valve on the cylinder and syringe before you withdraw the syringe from the Luer fitting.

5.7.6.1.6 Open the syringe on/off valve for 5 seconds to reduce the syringe pressure to atmospheric pressure. The pressure in the cylinder is ~30psi.

5.7.6.1.7 The gas mixture should be quickly transferred into the reagent water through the female Luer fitting located above the purging vessel.

NOTE: Make sure the arrow on the 4-way valve is pointing toward the female Luer fitting when transferring the sample from the syringe. Be sure to switch the 4-way valve back to the closed position before removing the syringe from the Luer fitting.

5.7.6.1.8 Transfer the remaining half of the working standard into the purging vessel. This procedure insures that the total volume of gas mix is flushed into the purging vessel, with none remaining in the valve or lines.

5.7.6.1.9 Concentration of each compound in the cylinder is typically 0.0025 µg/µL.

5.7.6.1.10 The following are the recommended gas volumes spiked in to 5 mLs of water to produce a typical 5-point calibration:

<u>Gas Volume</u>	<u>Calibration Concentration</u>
40 µL	20 µg/L
100 µL	50 µg/L
200 µL	100 µg/L
300 µL	150 µg/L
400 µL	200 µg/L

5.7.6.1.11 The following are the recommended gas volumes spiked in to 25-mls of water to produce a typical 5-point calibration: